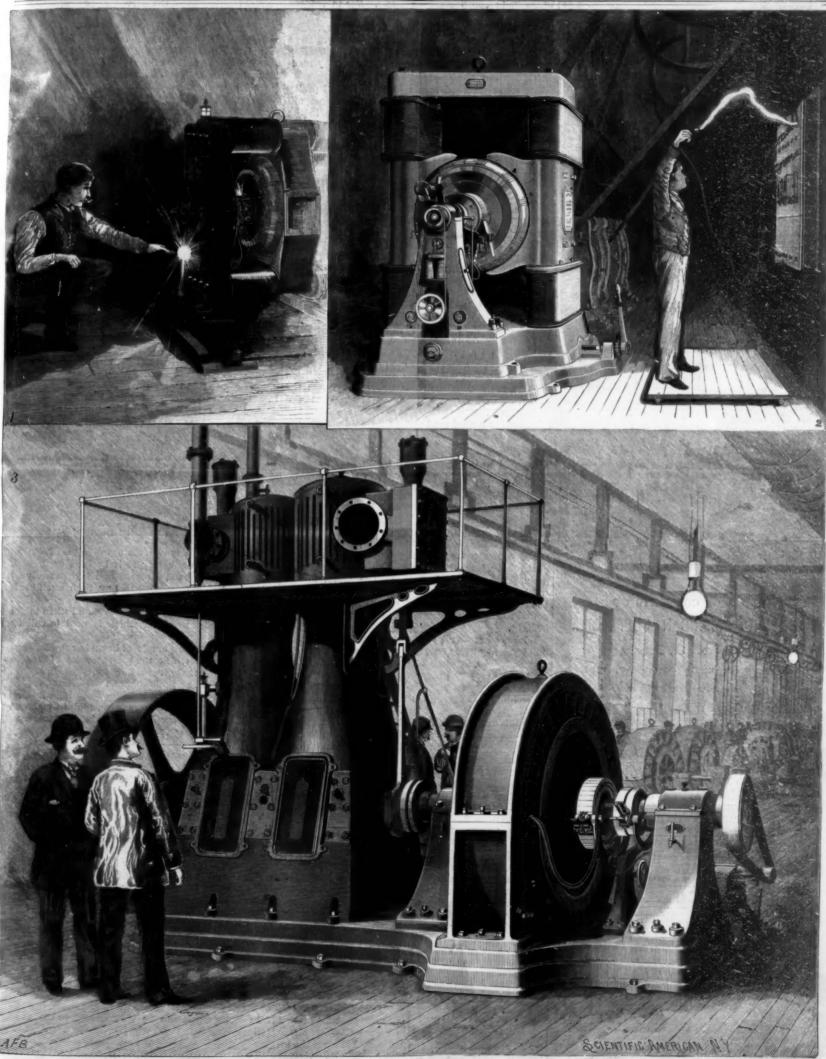


A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXXI.—No. 14.

NEW YORK, OCTOBER 6, 1894.

\$3.00 A YEAR.



1. Short circuiting the 80 light are machine. 2. The great 125 are light machine. 3. Six thousand light direct-driven alternator.

THE FORT WAYNE ELECTRIC CORPORATION-THE WOOD DYNAMOS.-[See page 210.]



# Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN. 

The Scientific American Supplement

The Scientific American Supplement distinct paper from the Scientific American. The Supplement elected weekly. Every number contains in octavo pages, uniform in size a year, for the U. S., 'anada or Maxico, Scio a year to foreign a year, for the U. S., 'anada or Maxico, Scio a year to foreign the selection of the Postal Union. Single copies is cents. Sold ill newedesies belonging to the Postal Union. Single copies is cents. Sold ill newedesies throughout the country. See prospectus, last page, supplied Entres.—The Scientific American and Suppliament be sent for one year, to one address in U. S., Canada or Mexico, on the of accommodate, to foreign countries within Postal Union eight for each 50 per.

Building Edition.

THE AMCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMEMIAN is a large and splendid illustrated periodical, issued mouthly, consining floor plans, perspective views, and absets of constructive dutalia,
ertaining to modern architecture. Each number is illustrated with
esultius plates, showing desirable dwellings, public buildings and archicetural work in great variety. To builders and all who contemplate buildge this work is invaluable. Has the largest circulation of any architeceral publication in the world.
Single copies 25 cents. By mail, to any part of the United States, Canada
Mexico, \$2.50 a year. To foreign Postal Union countries, \$3.00 a year.

Defines, \$6.00 a year. To foreign Postal Union countries, \$6.50 a year.

To foreign Postal Union countries, \$6.50 a year.

To foreign Postal Union countries, \$6.50 a year.

To foreign Postal Union countries, \$6.50 a year.

Spanish Edition of the Scientific American. 1.4 AMERICA CIRPITICA E INDUSTRIAL (Spanish trade edition of the CERTIFIC AMERICAN) is published monthly, uniform in size and typoraphy with the SCIRPIFIC AMERICAN. Every number of Le America is coverely illustrated. It is the finest scientific, industrial trade paper rinted in the Spanish language. It circulates throughout Cuba, the West of the Spanish Language is spaces. Spain and Spanish possessibles, Mexico, Central and South America, Spain and Spanish possession—wherever the Spanish language is spaces. 8500 a year, post paid to my part of the world. Single copies 25 cents. See prospectus. MUNN & CO., Publishers, 361 Broadway, New York

The safest way to remit is by postal order, express money order, raft or bank check. Make all remittances payable to order of MUNN Readers are specially requested to notify the publishers in case of ilure, delay, or irregularity in receipt of papers.

#### NEW YORK, SATURDAY, OCTOBER 6, 1804.

(Illustrated articles are marked with an asterisk.)

Leather softening, glycerine for 214 Line chalker, Neff's\* 213 Meedow Lake, Cal. 216 Meteorograph, Mont Mane Ob-servatory\* 227 Motor carriages and good roads. 210 Muscular offort and sugar and adelabra, et. : de fenders wanted per fronting simple 215 per fronting simple 215 tion seed oil industry, Eng-219 211 Ausonar of sugar and tobacco.

Notes and queries.

Notes and queries.

Observatory, Mont Blanc\*.

Patents granted weekly record.

Patents granted weekly record.

Photography, five views of one subject.

Plumbago, manufacture of.

Prices, the fall in.

Quince, the.

Eambow show bottle, a.

Rodda,good, and motor carriages

Rolling mill, co-operative.

Rouse, modern and ancient.

Bubbing. The science of.

Thermosterors, casily read? 717 lag. induction coil phonomec machines of the Fort yne Corporation 200 o storage battery traction, ris.... ic trolley cars, lighting.... Fruit and vegetable transporta-tion. 219 Gate, plutform, for cars, Young's 212 Glass, ornamenting. 219 Hemp, Kentucky. 210 House moving, long-distance. 215 Ink, blue, to use on glass. 215 Inwinting material. 217 Inwentions, recently patented. 250 Young's?
Weather and the mind.
Welding by pressure...
Wood, mines of.....

TABLE OF CONTENTS OF

#### SCIENTIFIC AMERICAN SUPPLEMENT

No. 979.

For the Week Ending October 6, 1894.

Price 10 cents. For sale by all newsdealers.

AERONAUTICS.—The Evolution of a Flying Machine.—By HIRAM T. MAXIM.—The story of Maxim's Sying machine as told by its

Note on the life of III. BLOGRAPHY.—Death of Brugsch Pasha.—Note on the life of the celebrated Egyptologist and philologist... 1541 The Maori King.—The life of a New Zealand putentate and por-trait.—I illustration 1561

CHEMISTRY.—The Iodonium Bases.—By CHRISTOPHER HARY-MANN and VICTOR MEYER.—An organic base containing iodine.—Its reposetion and ubvasionical action.

 ELECTRICITY.—An Ricctro Thermogenic Mattress.—A mattress heated by an electric current for the use of invalids.—3 illustra-A Ring Mectromagnet for Producing Intense Fields.—1 illustration.

Electrical Phenomena Illustrated by Applied Hydraulics.—Excellent hydraulic analogies for the phenomena of the electric current.—14 illustrations.

IX. MINERALOGY.—Development of Mineralogy. IV.—By L. P. GRATACAP.—Fourth installment of this exhaustive treatise on

#### MOTOR CARRIAGES AND GOOD ROADS.

The United States in some of its aspects, despite its great population, its large cities, wealth and inventive powers, appears susceptible of further advances, Of late agitation in directions affecting what may be termed its internal economies has been manifest, and good roads for the country districts, electric traction lines for country and city alike, and improved pavements for cities have been discussed on all sides by private citizens and by legislators. Ten years ago the steam railroad, the growth of little more than a generation, was pointed to with interest as a cause which had revolutionized the world. For in modern times the transportation of freight and of passengers is the most important business of humanity. idea of the steam railroad was the creation of large units of transportation. Great trains of cars bearing several hundred passengers became the railway manager's ideal.

The steam railroad seems to have reached pretty nearly its limit, and now a most formidable competitor for local traffic has come upon the scene in the electric road. The five and six car steam train is supplanted by a number of single trolley cars run at frequent intervals.

These matters the capitalists have in charge. But the improvement of roads and streets affects the municipalities, the county and State authorities, and very directly the individual. For on roads and streets the horse-drawn vehicle and the bicycle travel, and the latter, once a toy and now an everyday vehicle, is a principal cause of the new agitation. With good roads all over the face of the country, and with proper city pavements, a new field of work for the inventor at once is open. The horse is being more and more relegated to the background. The bicycle surpasses him in its powers of transporting humanity. It illustrates the immense reduction of friction on journals by the use of ball bearings. After ball bearings had settled this part of the problem, the rolling friction difficulty was solved by the pneumatic tire, and the bicycle, in great measure a perfected type of machine, is going into universal use.

In France recently there has occurred a competition between road vehicles driven by power. From the early days of this century repeated efforts have been to secure advances of money for this purpose from made to produce a road engine. To the existence of dealers and manufacturers. But I am glad to say is peculiarly adapted to its introduction on account of and usurious rates of interest as have been too common her good roads. There the bicycle is in universal with another class of fiber producers in the South-the use, and the power-driven road wagon may become a part of the machinery of transportation.

In the United States, with cobblestone pavements. and with sandy and muddy roads disgracing city and producing a successful traction engine or carriage can be accomplished. But the production of the bicycle has done so much to facilitate progress, and has solved so many of the mechanical problems of the perfect road vehicle, that it seems a pity that the power problem cannot also be solved. The motor is now what is wanted. It must be light. The bicycle of pound rider. The motor carriage of the future must

With good roads all through the country traversed on bicycles by every one, and with power-driven vehicles for freight, in place of horse and wagon, the life in the country districts would be revolutionized. ton, it is a crop that gives a fair money yield per acre, Daily delivery of the mail and of light express matter would become practicable, and the progress of the individual would be favored. But until good roads are preferring to grow more corn, and to make up come this cannot be. The trolley road as an approach the difference in their incomes by letting more land to the desired cheap traction has proved welcome to country and suburban dwellers. The advent of a practical power-driven vehicle coupled with good roads would prove just as welcome and more in consonance with the vested rights of the community in such roads as they possess; rights in which are now surrendered to the electric road companies with far too great readi-

#### Kentucky Hemp.

Mr. James K. Reeve, in the Country Gentleman, says: In 1882 the crop amounted to about 4,000 tons; it had not varied much from this for a long time, Cheaper fibers were brought in to help meet the demand for lower priced goods, and jute and sisal for a ton to \$100. The Kentucky crop for the present year is modeled it after the Chinese rather than after the estimated at only 8,000 tons, but there is no prospect Anglo-Saxon variety. It will not fall to the ground of an advanced value.

Besides the introduction of cheaper substitutes in the way of fibers, bemp has met disastrous competition from another source. The use of metal in the place of fibers has assumed large proportions. The first step in this direction, and one which largely curtailed the market for hemp, was the use of iron cotton ties-the straps which are used to bind the bales. Then came the introduction of steel wire cordage for standing rigging on ships. In connection with the baling of cotton, haul away cotton seed and burn it. Now they get bagging made from jute butts was also adopted in from \$6 to \$8 a ton for it.

place of the former hemp bagging. Thus, while its value is as fully recognized as ever, the relentless demands of competition have forced manufacturers to use cheaper substitutes, until the demand for it has almost ceased. Its principal employment now perhaps is for the adulteration of flax, with the single exception of which it is doubtless the best fiber pro-

To help the reader understand the cost of harvesting, and to realize the difficulties that are in the way of producing it more cheaply, a few words of explanation may be necessary.

From the time when the harvesting begins, which is in the latter part of August or by the first of September, a period of five or six months is required for preparing the crop for market. Generally speaking, a year may be said to intervene between the sowing of the seed and the selling of the product. The hemp is cut by hand, a knife set in at right angles to the handle being used. The work is pretty severe, as the stalks must be cut close to the ground, necessitating a constant stooping posture on the part of the workman. Cutting by machine has been tried, but it leaves a couple of inches of the butt of the stalk standing. This is just where the heaviest fiber is produced, and it is estimated that 200 pounds of fiber to the acre is lost by machine cutting. This, at 5 cents per pound, would amount to \$10, which is much more than the cost of hand labor. The subsequent handling includes stacking and spreading-which consists in laying the canes out in regular rows upon the ground, to undergo the process of retting. A good crop is calculated as one that when thus spread will fully cover the ground upon which it has grown. It is left thus for some weeks, depending upon the weather, until the retting (the word is probably a corruption of rotting) has progressed so far that the pith or inner part of the cane will separate readily from the husk or fiber. The separation is then done by means of a brake, a clumsy wooden tool operated by hand, which thrashes the woody portion of the stalk out from the fiber and leaves the latter finally ready for market. All of these processes are expensive, the braking alone costing \$1 per 100 pounds. The securing of the crop entails so much expense that it is quite common for the grower this machine a good road surface is essential. France they are not under such thraldom of crop mortgages cotton growers. One of the largest buyers of hemp in Lexington told me that he was already advancing money for the payment of harvesting expenses, charging no interest and only requiring that he should be country alike, much has to be done before the work of given the opportunity of purchasing the crop at its market value when ready.

After passing through the brake the hemp is twisted into a coil of about 5 pounds weight, which is called a "hand," and in this rough state goes to the dealer. In this warehouse or factory it is hackled or dressed, which is also a hand process, and is then ready for baling and shipment. In hackling, the short fiber is twenty-five pounds weight carries a two hundred separated from the longer, and makes a second quality. The fine waste product is called tow, and when mixed with tar becomes oakum, which is used in calking ships.

> From 800 to 1,400 pounds of hemp is considered an average crop. Even at the present price of \$100 per and might still be a profitable one were it not for the for tobacco.

#### Maxim's Flying Machine,

In reply to an inquiry whether his flying machine will fall edgeways like a kite in case the propelling mechanism should break down in the air, Mr. Maxim

says: The Anglo-Saxon kites, as made by boys in the United States and England, are rather crude affairs. They have to be provided with a tail, and, as we all know, they often fall to the ground edgeways, striking a very powerful blow in proportion to their weight. But in China men, and not boys, make and fly kites, and these kites are so perfectly made that they never fall to the ground edgeways, neither is it neces while nearly drove American hemp from the market, sary to provide them with a tall. My flying machine The fall in price has reduced the value from \$160 per is made somewhat in the form of a kite, and I have edgeways. In case the machinery should stop while it is in the air, the machine would be brought to the ground not in a vertical line, but would run down an incline on the air, striking the earth while moving ahead at a comparatively high velocity, while its vertical velocity would not be great enough to cause any serious damage to the machine or its crew.

TWENTY years ago Southern planters paid men to

We may smile at the ignorance and arrogance of the old Romans because they called their golden milestone in the Forum "umbilicus terrarum;" but after we have spent some days among her ruins, her churches and monuments, have had associations of more than twenty-five centuries recalled, and have noticed the activity and vigor in the present life of the city, we are almost, if not quite, ready to say, "Of course, Rome is the center of the world."

I presume that it is very common for travelers who come here to-day, to wish they could have come a century, or even a generation, ago, when old Rome was less obscured by the bustling capital of the young kingdom of Italy. However, there are compensations. Some of the interesting discoveries are very recent ones, and modern Romans are but repeating the history of their ancestors, in building on old foundations; the continuity is being preserved.

It is a curious fact that this city, which in the past has had the vicissitudes of war and pestilence and prosperity, is suffering now from what is known in America as a "boom." There has been over-building, banks have loaned money on security which did not secure, and unfortunate depositors are beggared. In their haste to build, too, they have forgotten that they live over enormous caverns, and some large structures have collapsed after they were finished, in much the same fashion that others have in a land that had not been dreamed of when Rome was mistress of the world.

But the general aspect of the city is decidedly one of thrift and stability. The new streets are wide, clean and well lighted; so many railway tracks run into the central station that one instinctively says, "All roads lead to Rome!" The new churches have a splendor about them that the old ones lack, albeit there is no Michael Angelo to be their architect and no Raphael to paint their Madonnas. The monument to Victor Emanuel, which is being built on the Capitoline Hill, will doubtless be grander than any other in Europe. It is to include 200 frescoes, 400 statues, and to cost 12,000,000 francs. The equestrian statue of the King will overlook not only the present city, but those wide outlying lands which were thickly populated when Rome was half as large as London now is.

And it is that Rome and her beginnings which most interests the stranger. So much and so well have the best known objects of interest been written about, that I cannot say anything new about them; the most I can hope to do is to refresh the memory of them in some readers' minds and suggest to others that it is worth while to spend a short time in Rome if one cannot do more

With a scholarly guide, who is thorough master of the history and geography of the city, ancient and modern, a great deal can be accomplished in a week. Such a guide is indispensable to the visitor who wants to make the most of his time.

The seven hills seem to-day more traditional than real. Standing on the Capitoline, the Esquiline, the Coelian, the Viminal, the Quirinal, the Palatine and the Pincian are pointed out as quarters of the city; they differ so slightly in elevation from the valleys between them that we drive from one to another scarcely noticing any change in the level. It is hard to believe that once they were distinct and each had its own wall. The hills were never high, and Rome's masters have not scrupled to level them as they have her palaces and temples when they saw fit.

The present city is from 16 to 22 feet above the level of the ancient Forum. Some of the most interesting ruins stand upon the site of others which far antedate them. Emperors and Popes alike have sought to beautify the city or immortalize themselves at the expense of whatever they could lay hands upon.

The Coliseum, for example, was for 130 years used as a quarry, and because it was so well built that it was more labor to get stone from it than from the bills near by, the Popes not only robbed it themselves, but one of them offered a premium to any one who ing power of the gold bullion, and the different kinds would take building material from it. And yet it is today the most impressive ruin in Rome. The outer walls chasing power, by the policy of the Treasury depart are made of large blocks of travertine from the Sabine Hills; they are laid without mortar, but still are closely joined, and age has given them a soft, gray brown tone. They cover walls of enormous thick- This prevents gold coin from going to a premium. ness made of brick and tufa in alternating layers.

were covered outside and in with white marble and a dollar for it. Whenever that happens it will be imornamented with tiers of marble columns! The lower possible for the Treasury to pay out gold and silver columns were Doric, the next Ionic, and the third tier without distinction. Gold will then only be obtainable Corinthian. The fourth story, built by Titus, had from private individuals, and will go to a premium, windows separated by Corinthian pilasters. The in- while silver dollars will have the same purchasing terior marbles, which, like the exterior ones, have all power as 371% grains of silver bullion. Free coinage been carried away to be used in other buildings, were advocates say the price of bullion will rise. Possibly taken from Nero's golden house, which was near. The it might rise 10 per cent; if so, the purchasing power Coliseum stands in what was his palace garden, its of the dollar would be 55 per cent of what it is now. center, where was an artificial lake. Its present name, If it rose 20 per cent, its purchasing power would be given in the eighth century, it is supposed, was given 60 per cent of what it is now. In order for the dollar remembered that it was begun by Vespasian in 60 is extremely improbable. It is quite probable that the

A. D. and was finished in eleven years. Twenty thousand captive Jews worked upon it. It is a third of a mile in circumference, and not round, as some pictures represent it, but oval, its longest diameter about 205 yards, the less 160 yards. The height of the walls is 165 feet, and this also, I was told, is the depth of the foundation. There are four tiers of seats; the lowest was for the Emperor, the nobles and vestal virgins; the next was for the freedmen; the third, for the soldiers; and the upper row was set apart for the slaves. From 87,000 to 100,000 people could be seated, and so numerous were the entrances, and so perfect was the arrangement of the staircases for the different tiers of seats, that it is believed that the great theater could be emptied in ten minutes. The audience was protected by a movable awning which was drawn by sailors from the imperial fleet, stationed in the soldiers tier. Some of the iron fixtures used for the awnings, or the grooves in which they were, are yet to be seen.

The arena, which measured 98×58 yards, as now seen is at two different levels. The upper one was made in the fourth century, the older one has been excavated only in part. It was the custom to keep the wild beasts in dark dens for forty-eight hours without food, before they were to fight, and then from thirty gates they bounded together into the arena. bronze wall with an ivory coping protected the sitters in the lower seats from their attacks, and slaves were stationed behind gratings, where they could strike an animal which attempted to cross this barrier. The arena was three times flooded for naval contests. After Constantine's time, gladiatorial fights were no longer allowed, but beasts still furnished entertainment to the crowds.

In the eighth century, these fights, too, had ceased, and the huge structure was used as a hospital; the wide arches supporting the walls were shut in with boards, and rows of beds were placed under them. When, in the seventeenth century, the French turned the Coliseum into a fortress, the horses were kept on the lower arena. Pope Pius VI. made a chapel of one of the 26 rooms from which the gladiators and Christians came upon the arena. The beauty of the ruin by moonlight has not been exaggerated; but only a poet can describe the scene when to the majesty of the pile dimness and mystery are added. A. D.

Rome, 1894.

#### The Silver Dollar.

The purchasing power of the silver dollar, which is now equal to that of the gold dollar, would be reduced if the present policy of the Treasury were abandoned. Silver dollars would remain a legal tender, but that would not preserve their purchasing power. They would have the same debt-paying power as gold, but no debts would then be paid in gold. Silver or its equivalent would be exclusively used to pay debts, and would have for that purpose the same power as at present; but when used to purchase commodities its value would be reduced, because the prices of goods, in silver, would be raised. The purchasing power of a dollar at present is the same as that of 23.22 grains of fine gold, whether in bullion or gold There are 87114 grains of fine silver in a dollar, but it requires about twice that amount of silver bullion to purchase 23.22 grains of gold bullion. This simply means that we are using the gold standard. If we had the silver standard, the purchasing power of the dollar would be that of 3711/4 grains of silver bullion, which at present is about fifty cents.

The ratio of 16 to 1 of gold to silver simply means that 16 ounces of silver are of equal value with one ounce of gold. Recently an ounce of gold has been selling for as much as 32 or 33 ounces of silver; as the exact ratio varies from day to day, we will call it 32 ounces. Now it is obvious that the dollar cannot be worth at the same time the value of the gold bullion which it contains and the value of the silver bullion, since these are in the ratio of 2 to 1. It may be either, but it cannot be both. At present it has the purchasof dollars are kept at a parity, that is, at equal purment, which gives to the citizen the sort of dollar which he desires. A note which calls for coin is paid in either gold or silver at the option of the holder.

Free coinage means that the government shall take How dazzling must it have been when these walls 3711/4 grains of silver, worth about fifty cents, and give from the colossal statue of Nero. Before that time, it to retain its present purchasing power, it would be was known as the Flavian amphitheater. It will be necessary for silver bullion to rise 100 per cent, and this

adoption of the silver standard would put up the price of siver bullion for a time. The passage of the Sherman act in 1890 put up the price of silver to \$1.21 an ounce in about a month. Then it began to recede, and it is now from 64 to 65 cents. Probably something of the same sort would follow free coinage, but in the end the purchasing power of the dollar would probably not be materially higher than the present price of 3711/4 grains of silver bullion. Our adoption of the silver standard would slightly increase the demand for silver, but it would not be equal to the demand which existed prior to 1873. Hence the need of an international agreement as to the use of silver and its ratio to gold.-Louisville Courier-Journal.

#### The Quince.

The quince, says a writer in the New York Weekly Tribune, is one of the most valuable fruits we have for preserving, though it can be used for little else, except to add flavor to the plain dish of apple sauce. The best quinces are the large apple quinces, which make such beautiful red preserves. Some fable says that the quince, and not the orange, was the golden apple of Hesperides. Certain it is that the quince is one of the oldest of fruits, and was in use in early English times, and even in ancient Greece

Quince jelly is one of the easiest jeilies made, and therefore one of the best for the amateur to attempt. Cut the quinces into bits, without peeling them, and put them in a porcelain kettle with a little water in the bottom to prevent their burning. Put in all the cores that are not wormy. Cover the quinces closely and let the juice gradually draw out, until the whole mass is a soft liquid pulp. Squeeze this pulp through a linen cloth, and measure the juice. To every pint of juice add a pound of sugar. Boil up the sugar and juice until they turn to a jelly. It requires to be boiled from half to three-quarters of an hour, according to the amount of water that was added. Long boiling tends to make the jelly light and clear colored, but it should not boil long enough to be stringy and tough.

A most delicious jelly is made of one-half pound pippins and one-half quinces. This apple and quince jelly is more delicate than a jelly of pure quinces, and is especially nice for layer cakes and puddings. For jelly use the ordinary small quince or the large smooth quince.

To preserve quinces, core, pare, and quarter them. Lay aside the cores and parings and any imperfect piece for marmalade. Drop the pared quinces in boiling hot water and cook them until they are just tender enough to pierce with a straw. Then put them in bottles. Make a sirup of the strained water in which the quinces have been cooked, allowing two pounds of sugar to a pint of water and three-quarters of a pound of sugar to every pound of quinces. When this sirup is boiling hot pour it over the quinces in the jars. Seal them up and cook them for ten minutes longer, the jars set in water boiling around them. A rich, wellflavored quince treated in this way makes a preserve in which the sirup forms a light jelly around the pieces of quince.

To make a nice marmalade, add about one-quarter pippin apple to the skins, cores and pieces laid aside. Add any water left in which the quinces are boiled. Let the fruit boil for half an hour, then strain it through a colander fine enough to strain out all the seeds, but coarse enough to allow the pulp to go through. Allow three-quarters of a pound of sugar to a pound of fruit, and let the whole mass boil for an hour and a half longer.

#### A Rainbow Show Hottle.

To prepare this, first ascertain the capacity of the bottle and divide by 7, to find the volume of liquid required for each layer. Then take sulphuric acid to begin with, and tint it blue by the addition of indigo sulphate. For the next layer use chloroform; for the third use glycerine tinted with caramel; for the fourth castor oil colored with alkanet root; for the fifth, proof spirit tinted with green aniline; sixth, cod liver oil, containing 1 part of oil of turpentine to 99 of the fish oil; seventh, rectified spirit tinted with violet aniline. Each of these should be poured in through a tube, the lower point of which should be directed against the side of the bottle, so that the liquid may trickle gently over the surface of the layer below it.-National Druggist.

#### A Co-operative Rolling Mill.

The result of an attempt to operate a rolling mill at Hubbard, O., on the co-operative plan is interesting. After paying up all outstanding indebtedness there was a surplus of about 25 per cent to distribute to the stockholders out of the 50 per cent of the wages that have been retained by the managers to create a capital. This is equivalent to a reduction of 25 per cent in wages for the time that the mill was in operation. In other words, in order to get out even the company could only afford to pay 75 per cent of the wage scale. Doubtless the hard times was the cause of this ill sucTHE LONG-RUNNING METEOROGRAPH OF THE MONT BLANC OBSERVATORY.

order to obtain the registering of the principal phenomena of the summit, to construct an instrument that should run for a very long time (that is to say, during the winter and spring) without being wound up.

This is a problem that I asked Mr. Jules Richard to solve, and that led him to the construction of the remarkable instrument which I have just presented photographs of and which Mr. Richard has placed before the eyes of the Academy.

The entire instrument (Fig. 3) is actuated by a weight of 200 pounds descending from a height of about 20 feet in 8 months. This weight moves a pendulum that actuates and regulates the motion of the apparatus.

As a pendulum was required that should be affected as little as possible by the variations of temperature, Mr. Richard selected the escapement one of Denison, which he improved (Fig. 2, A).

The advantages of this escapement are, on the one hand, the permitting of the use of a very small quantity of oil, that may be even null when the surrounding atmosphere is entirely free from dust. Denison states, even, that it has been impossible to observe any variation in the amplitudes of the are of the balance when the oil was frozen and had the consistency of tallow.

All the motions of the meteorograph are communicated to it by a horizontal shaft, which receives its motion from the pendulum, at the rate of one revolution in twenty four hours and communicates it to the bobbins and the various parts of the registering apparatus.

These bobbins with a speed variable in each instrument unwied the paper upon which the pens of the registering apparatus are to write.

BAROMETRIC REGISTERING APPARATUS.

The apparatus that registers the variations in barometric pressure is seen in the center of the engraving (Fig. 2, B).

The motions of the needle are controlled by those of the mercary in the lower branch of a Guy-Lussac barometer with a very large reservoir. I have adhered to the use of mercury on account of its offering a great guarantee of exactitude. THERMOMETER AND HYGRO-METER.

For the registering of the temperature and humidity, we have been obliged to have recourse, for the former, to the Bourdon system of metallic reservoirs, and for the latter to the hair hygrometer of Saussure. The thermometric reservoir and the cable formed by the hairs are connected with their respective pens by long rods, so that these parts can be exposed to the action of the external atmosphere, while at the same time preserving the registering in the interior.

REGISTERING ANEMOMETER. The registering of the velocity and direction of the wind is done upon the same

paper. The following is the solution of the principle adopted by Mr. Richard: A cylinder carrying a cer-By reason of the difficulty of reaching the Mont tain number of spirally arranged cams receives its cession and forces to write during the entire time of Blanc Observatory in winter, it became necessary, in motion from a weather vane or a Robinson rotary ap-1 the cam's action. For the direction, the apparatus



Fig. 1.-VIEW OF MONT BLANC OBSERVATORY AT THE BEGINNING OF THE YEAR 1894.

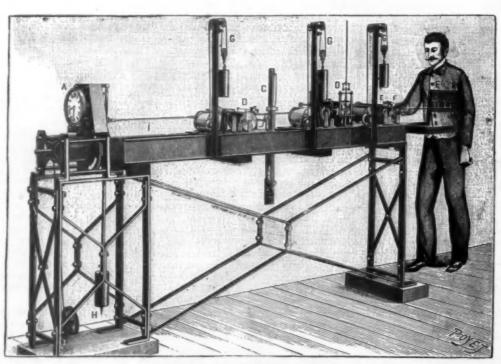


Fig. 2.-LONG-RUNNING METEOROGRAPH.

ning eight months. B. Registering system of the barometer. C. Barometer. D. Anemometer. E. Pen of the thermometer. Pr. Hairs of the hygrometer. G G G. Motive counter-F. Pen of the hygrometer. E'. Reservoir of the thermometer. poises. H. Pendulum. I. Transmission of motion of the clock to the different registering apparatus.

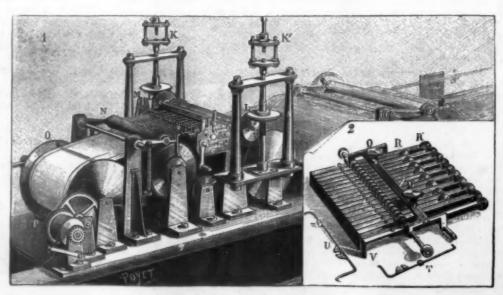


Fig. 3.-DETAILS OF THE METEOROGRAPH.

No. 1.—E. E. Gearings of the weather vane and anomometer rods with the registering apparatus. L. Cam roller for velocity of the wind.

L'. Cam roller for direction of the wind. M. Group of inscribing needles. N. Paper roller. O. Drum upon which the inscribed paper winds. P. Device for winding the paper after the registering. No. 2.—General view of the writing system. Q Q'. Buttons to allow of the removal of the needles. R R'. Wheels actuated by the cams, L and L'. T. Details of a tube pen of the anemoscope.

U. Details of a tube pen of the anemometer. V. Series of tube pen carriers.

paratus, and acts by means of these cams upon the tails of an equal number of pens, which it lifts in suc-

carries eight pens, representing the eight principal directions of the wind. For the velocity, the cylinder is provided with ten cams that act in succession upon ten pens. Each pen is engaged during a tenth of a revolution of the cylinder, which represents a six-mile travel of the wind. The velocity is therefore represented here by the greater or less length of the traces left by the pens. The perfection with which the entire apparatus is executed does credit to Mr. Richard, and I am sure of being the interpreter of his feelings in giving praise also to Messrs. Emile Honore and Henri Libeert, who had special charge of the execution of this fine instrument. Such is the entirely new apparatus that is to be mounted upon the summit of Mont Blane. I do not conceal the fact, despite the minute precautions that have been taken, that we are still in the presence of the unknown. But the interest of the question of these long-running registering apparatus, which will render so many services at elevated stations in which it is impossible to remain, is so great in my eyes that I have not hesitated to begin the experiment at once, leaving to experience the care of instructing us as to the modifications that it will be well to introduce into them in order to secure a sure and entirely satisfactory operation. — J. Janssen, in La Nature.

#### Protection of the Beet.

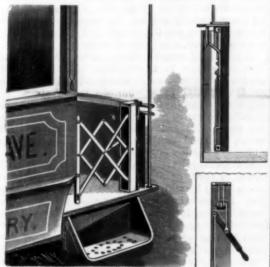
Many agronomists now recommend a very excellent method for the destruction of the May beetle and its larvæ, besides several other insects belonging to the same family. The Sylpha type makes its appearance on wheat fields that have followed beets in the rotation. The eggs have been deposited upon fermenting vegetable residuum left on the fields after harvesting. Many plans, says the Sugar Beet, have been adopted, such as sulphide of carbon combined with water and soap, arsenic preparations, etc.; none of them give entire satisfaction. The best of all modes consists in using strips of zine placed on and slightly penetrating the ground in a slanting position. The joints between strips must be well looked after. The beetle cannot climb on the surface of the zinc, but continues along the border, to subsequently fall into ditches placed at regular intervals. In these a small quantity of sulphuric acid is placed, causing the immediate destruction of the beetles. The portions of the fields to be protected are those corresponding to the direction of adjoining fields, from which the army would make its march. Other preparations, such as tar, quicklime, etc., have all been tried. The tar scon acquires a hard surface, and the lime exposed to air will quickly become earbonated. The beetles would then find no hindrance to the destruction of a crop of beets found in their path.

#### Manufacture of Plumbago

212° F.; steatite is then added, and more water if re- pipe broke, and the trials were postponed. quired. After mixing, excess of water is evaporated until a consistency suited to grinding in a chilled steel or other mixer is obtained. More graphite may here be added; then, after thorough grinding, the material may be compressed into cakes for household use, or is ready for the manufacture of pencils or crucibles. The average formula for the mixture is: Graphite, 80; steatite, soapstone, or tale, 14; alum, 6 but this varies with the purpose to which the material is to be applied. When several different kinds of graphite have to be employed, the richest in earbon is first mixed into the alum solution. By this proce graphites previously regarded as incapable of being compacted are utilizable, and are improved in polishing power; for pencils, the material may be hard without being brittle, and black without being soft; while crucibles made from the treated graphite are at once harder, more durable, and lighter.—P. F. Johnson.

#### A PLATFORM GATE FOR CARS, ETC.

The gate shown in the illustration is of exceedingly simple construction, easily operated and readily locked in either open or closed position. It has been patented by Mr. Frederick W. Young, of No. 9 Hill Street, Bloomfield, N. J. It has a post-like partly open casing secured to the car platform and the dashboard at one side of the latter, and in the sides of this casing near the middle are pivoted two members of a set of lazy-tongs, the other members of the set being pivotally connected with the post forming the free end of the car opposite the casing when the gate is closed, and in its upper and lower ends are vertical slots in which are pivoted the ends of another pair of lazy-tongs, whose opposite ends are connected by pivots with links having vertical movement in the casing, the links being pivotally connected with a handle lever, as shown in the small figures. The two sets of lazy-tongs



F. W. YOUNG'S SAFETY GATE.

are independent of each other, and by moving the handle lever up or down the gate is opened or closed, bevel catches on the inner face of the dashboard locking the lever in either the lower or upper position. The easing at the side of the dashboard is of such width as to accommodate all the members of the gate proper, so that no part of it projects when the gate-

#### The New British Torpedo Boat Destroyers.

The torpedo boat destroyers Havock and Hornet, during the recent maneuvers, although they rolled about in an unmerciful manner to their crews, proved to be good sea boats. The Havock had to return to port for repairs, while the Hornet broke down altogether, and, had she been alone, would most probably have foundered. She had only just been asked to show the stuff she was made of by catching a torpedo boat when the cylinder cover cracked, two piston rods mony. Two cylinders thus welded together could be bent, and a large hole was knocked in her condenser. Both engines were placed hors de combat, and she was chuck, while the other was being worked upon by a towed into port by the Speedy. In consequence of the defective working of the machinery of these catchers, it is reported that vessels of this type are in future only to be employed in couples.

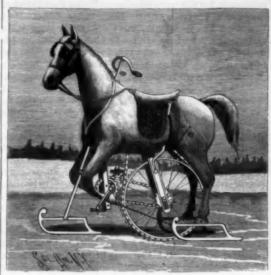
Two more torpedo boat destroyers have taken the water, the Sturgeon, on July 21, from the shipbuilding yard of the Naval Construction Company, at Barrowin-Furness, and the Rocket, on August 14, from the yard of Messrs. J. & G. Thomson, at Clydebank.

trips. The latter vessel, during six consecutive runs over the measured mile at the Maplins, attained a mean speed of 27.341 knots. During the three consecu-

tive hours of full speed steaming the mean speed at-Graphite crushed and passed through a sieve of tained was 27.77 knots, or more than three-quarters of from 120 to 150 meshes per inch is stirred into a a knot over the contract. The Lynx had attained a saturated solution of alum or aluminum sulphate at maximum speed of 28.3 knots, when a joint of a small flowed out at 180°. By placing a perforated disk of

#### A VELOCIPEDE TO RUN ON SNOW AND ICE.

This machine, patented by Mr. Samuel Young, is preferably made in the form shown in the illustration,



SAMUEL YOUNG'S ICE VELOCIPEDE.

although its body may be constructed substantially the gate. This post is adapted to engage keepers on like that of a safety bleycle. As shown, the front legs form hangers for the pedal shaft and the rear ones are detachable and each connected with a runner. The steering rod, with a handle bar on its upper end, passes through the front portion of the body, and its lower end is secured to a runner. In a recess of the body above the pedal shaft is a vertical U shaped hanger adjustably secured to the front legs by screws passed through one of a series of holes, whereby the height of the hanger is regulated, and the hanger supports the pedal shaft, mounted in suitable boxes. The driving chain from this shaft extends backward over a sprocket wheel, connected with a large sprocket wheel journaled in vertically moving slides which project up into the body of the machine, the large wheel carrying a spur chain adapted to contact with the snow or ice. The slide frames are carried by a slotted clip in the under side of the body, and the spur chain runs over a sprocket wheel on a shaft journaled in vertically adjustable boxes in the upper ends of the slides, the latter resting on springs which also support a portion of the Connected also with the slides are rods which extend upward on opposite sides of the body and terminate beneath the rear end of the saddle. Chains connect the rear runners with the front legs. Further information relative to this improvement may be obtained of Mr. Samuel Young or Mr. Michael A. Powers, Ontonagon, Mich.

#### Welding by Pressure.

According to Nature, M. W. Spring, who about fifteen years ago proved the possibility of welding metallic bodies by simple pressure at temperatures far below their fusing point, publishes an interesting extension of his researches in the Bulletin de l'Academie Royale de Belgique. He was led to the conclusion that at a certain temperature, where a metal is to all appearances a perfect solid, a certain proportion of the molecules attain a rate of vibration corresponding to the liquid state, and that these molecules, by softening the body, make it capable of welding and of producing alloys with other metals. The metals were put in the shape of cylinders bounded by plane surfaces, upon the purity of which great care was bestowed. They were then mounted in a stirrup, and pressed together by means of a hand screw. In this state they were placed in a heating oven, and kept at a constant temperature between 200° and 400° for from three to twelve

The most perfect joints were produced with gold, lead, and tin, and the worst with bismuth and antiput in a lathe, one of them only being held in the cutting tool, without coming apart. They could be separated with the aid of pincers, but then a rough eight hours, the spiral had entirely disappeared, and line after being chalked to a fixed point.

the surface looked as if just fused before the blowpipe. Where two metals were employed, alloys were formed, which, in the case of lead and tin, were fusible and mica between the two, the outflow could be prevented, but the alloy formed at the center and the metals were hollowed out in the proportion of their degrees of liquefaction. In a lead-antimony couple, the hole in the lead was 8 mm. or 9 mm., and that in the antimony 2 mm. The most striking and novel experiments, however, were those showing the evaporation of metals, or rather their sublimation, at temperatures between 300° and 400°. This was also shown by inserting a disk of mica say between a zinc and copper couple at 860°. When air was carefully kept away from the surfaces, the copper was tinted a golden yellow over the area of the hole in the mica, the exact color of tombac, and a brown layer was produced on the zinc, which chemical analysis proved to contain copper. Similar results were obtained with cadmium, the thickness of the mica being 0.8 mm.

#### Lighting of Trolley Cars.

A system of lighting tramears by electricity has been devised by Mr. W. M. Miner, the electrical engineer of the American Manufacturing and Engineering Company, New York, and a demonstration of it was recently given as installed in a car in Hoboken, N. J. The visitors were conveyed in the car, and in running over the line the trolley circuit was frequently broken in order to show the value of this system in always keeping the car illuminated whether the trolley wheel is on or off. The system consists in the use of a small storage battery of six Donaldson-Macrae storage cells, which are used to light a duplicate set of lamps should the trolley come off or the motor current give out or be interrupted in any way, the battery being switched on automatically when the motor circuit is broken. A trolley current is passed through an electromagnet, which completes a circuit through incandescent lamps connected in series in the usual manner. The same current also passes through the storage battery, keeping it charged. If the trolley comes off, or the current gives out or is interrupted in any way, the armature of the magnet is drawn back against its backstop, closing the supplemental circuit from the storage battery through a switch to the armature of the magnet, backstop and lamps, returning to the storage battery, thereby insuring light in the car whenever lights are required, independent of the action of the trolley. When the main circuit is restored by replacing the trolley or otherwise, the current takes its original course through the main circuit lamps, energizing the magnet (drawing its armature away from the backstop), storage battery, and ground, recharging the storage battery and lighting the car as before, thus automatically insuring a constant light in the car under all circum-

#### A LINE CHALKER FOR CARPENTERS' USE.

This simple and inexpensive device, while serving as a holding reel for the cord, is also a line fastener or securer, to hold the line after it is chalked at any desired point from which the mark is to be made. It has been patented by Mr. John W. Neff, of Buckhannon, West Va. Journaled in a frame having a convenient handle, as best shown in the small view, are



breakage was produced which did not coincide with a line reel and a chalk-holding shaft, geared to be the original plane of separation. It appears that the operated together by means of a crank on the line reel more crystalline the bodies are the less do they exhibit shaft. The frame is preferably made in two sections, this phenomenon of incipient liquefaction, which be held together by screws, to facilitate placing and regins to show in the case of platinum, for instance, at moving the shafts. The chalk-carrying shaft has one 1,600° below its fusing point. That such a liquefaction end threaded and fitted with an adjusting screw, or softening actually takes place was proved by cut- which bears on a disk sliding on the shaft, to clamp The Lynx and Decoy have made successful trial ting a delicate spiral 0.2 mm. deep on the end surface a centrally apertured cylindrical piece of chalk thereof a piece of copper weighing 130 grammes, and placing on. A notched, spur-like projection from one end of it upon a sheet of mica. After keeping it at 400° for the frame forms a convenient means for holding the

#### Treatment of Apoplexy.

Preston, of Baltimore, believes that in the treatment of apoplexy more might be done in the prodromal stage if this condition were more carefully studied and oftener recognized. There are no constant or certain prodromata, but in a considerable proportion of the cases here related the history obtained afterward from the patients showed the existence of headache, vertigo or a sense of fullness in the head, numbness of one side, etc. These symptoms in some instances existed for a week before the apoplectic attack. It is very important to heed these warnings, especially in cases where there is atheroma of the vessels, or where there is high arterial tension without atheroma. Rest, vascular sedatives, nitro-glycerin, large enemata, will often modify the force of the circulation and thus tend to avert the rupture of the artery. Some years ago the writer called to see an elderly woman, stout, with flushed face, headache, and unusually high arterial tension. While waiting for the family physician she was kept absolutely quiet, with ice to her head. While consulting in the next room, the patient, against orders, got up to use the commode; the arteries could stand no further strain, rupture occurred, and she died in half an hour, with all the symptoms of intracranial hem-Venesection would probably have averted this disaster. It rarely happens that the physician sees clearly enough to make use of bloodletting. After the rupture of the artery has taken place, it is doubtful whether venesection does any good. The most important part of the treatment of apoplexy is rest. There is no way by which the bleeding can be stopped, and it is probable that in the great majority of case the increased intracranial pressure tends to control the hemorrhage. The ruptured artery or miliary aneurism is small, as a rule, and it is generally soon occluded by clot. If the amount of hemorrhage is moderate and not in a vital part of the brain, recovery, more or less complete, will take place if the clot re main in its first position.

Very often it happens that the original location of the clot was not specially dangerous, but from gravity or as the result of exertion the clot has forced its way through the soft brain tissue and done irreparable injury to more important structures. This can often be seen post mortem and the track of the clot made out. From this it follows that the greatest care should be exercised to prevent any more moving of the patient than is absolutely necessary. If it be possible, the patient should be laid down on a sofa or mattress in the room where the attack occurs and no attempt at movement made for twelve or twenty-four hours. It is better to slightly elevate the head by pillows, since this probably tends to modify the force of the heart's action in the cerebral vessels, and at the same time allows respiration to be carried on rather better than when the patient is perfectly flat. Opening the skull has been resorted to, but it is doubtful whether this is advisable, except in the case of meningeal or cortical hemorrhage. The ice cap to the head is of some use in allaying restlessness, and is extremely good treatment for the relatives and friends. In regard to drugs in this early stage there are practically no therapeutic indications that can be successfully met. The use of ergot and that class of remedies is of more than doubtful propriety. Aconite may sometimes be used to advantage in controlling a too forcible heart's action. As soon as the patient can swallow, it is the author's custom to administer a mixture of bromide and iodide of potassium, 30 to 40 grains of the former and 10 grains of the latter, and this is kept up for several days, then the bromide is omitted and the iodide used alone in increasing doses. In regard to the custom of administering croton oil or some drastic purge during the early stage, although sanctioned by almost immemorial usage, it is not only useless, but exposes the patient to the risk of making dangerous exertions, besides putting him in a filthy condition. The same objections in part apply to blistering and to the use of It is remarkable, however, that instead of the greatest mustard. It is important to attend to the bladder and draw off the urine at regular intervals. The throat should be kept as free from mucus as possible and the surroundings of the patient rendered comfortable. These points have, perhaps, been dwelt upon with unsary minuteness, but one so often sees these cases handled in a mischievous manner. The physician, realizing the futility of any active treatment, is too apt about 3 P. M., the amount of work accomplished reaches to yield to any suggestion made by the family, and the its maximum. Then, from some unexplained cause, object of this paper is to insist upon a simple and ra- there is a notable fall at 4 P. M., which is succe Journal.

#### Glycerin for Softening Leather,

but soon sweats out in damp air. To fix it in the leather, it should first be incorporated with four times its weight of the buttery mass made by dissolving beef fat in warm cod oil. Another method of rendering the physiological fact, regular exercise caused increase in glycerin a permanent constituent of the leather is to incorporate it with a small proportion of white of egg. by the above described glycerin oil. A solution of ed to be a muscular food; since, when taken on an empty dextrin may be substituted for white of egg if this stomach, there was on that day an increase of 25 0 per

latter be too costly. By dissolving a tan stuff in glycerin and mixing it with cod oil and fat, a valuable stuffing for leather may be obtained.

#### Street Car Fenders Wanted.

By an ordinance of the authorities of Baltimore the street car companies are required to provide their cars with fenders. With this view a commission was formed, consisting of the mayor, city register, and city commissioner, for the purpose of considering the subject of life guards for trolley cars. Mr. Mendes Cohen, Past President Am. Soc. C. E., was employed to investigate and make a report on all fenders which came to his notice. In all, 70 different types were offered, but out of this number, which included nearly all, if not all, of the best known fenders, none met with his unqualifled approval.

In concluding his report, Mr. Cohen says, in part: What is needed is a very simple piece of work, the more simple the better.

It is required that the front surface of the car, striking a standing human being, shall be so arranged as to afford a reasonable prospect of saving the person from being dashed to the ground; and, further, so arranged that it shall do the least possible damage by its own impact; and, further, if it fails to do the duty expected of it, and the person does fall to the ground, or is already lying there, that it shall be so devised as to s over him without causing further injury; and that there shall also be on each car a suitably arranged wheel guard, preferably of angular or "pilot" form, which shall be automatically brought in clos : contact with the street and rails, in order to prevent the crushing of the victim, whom the front device has failed to

#### EASILY READ THERMOMETERS.

The instrument shown in the illustration, styled by

its manufacturers "a distance reading thermometer," is designed not only to be up to a good standard of accuracy for all ordinary requirements, but it presents the special advantage of beproportionately greater distances in the larger sizes. As large figures are used, they are placed alternately on opposite sides of the scale, which is divided into alternate light and dark spaces by sections of ten degrees, the limit of each section being thus distinctly seen in such manner as to show at a glance the indicated temperature, The tube is filled with red spirits, guaranteed to be non-fading, and the liquid presents to view a wide surface. The makers of these instruments, Messrs. Ward & Doron, of Rochester, N. Y., have had forty years' experience in the manufacture of thermome ters.

# The Influence of Sugar and Tobacco on Muscular Effort,

In 1893 an important series of experiments was undertaken by Dr. Warren Lombard upon the influence of tobacco on muscular effort. The same subject has been investigated by Dr. Vaughan Harley, and the results of his observations are recorded in the first part of the Journal of Physiology for the present year. Dr. Vaughan Harley agrees with Dr. Lombard in considering that the amount of work done by the same set of muscles at different times of the day undergoes periodical variation; so we may accept as a fact that there is a diurnal rise and fall in the power of doing voluntary muscular work, in the same way as there is a diurnal rise and fall in bodily temperature and pulse. amount of work being done, as might have been expected, on rising in the morning after a night's rest, it is found that at 9 A. M. the smallest amount of work is accomplished, the powers of doing muscular work in Dr. Harley's case increasing each hour up to 11 A. M. Immediately after lunch there is a marked rise, followed an hour later by a fall; while again an hour later, or Glycerin imparts considerable suppleness to leather, A. M. Dr. Harley admits, however, that further experiments are required to determine this point satisfactorily. It was found in his experiments on the muscles of the the size of the muscles brought into play, and at the same time up to a certain point rendered them capable

cent in the work done by the left middle finger, while the right middle finger showed an increase of no less than 32.6 per cent. Dr. Harley varied the experiment of administering sugar in many different ways, but always with the same result; the vigor of the muscles was always augmented. The influence of tobacco was not so marked in Dr. Harley's experiments as in those of Dr. Lombard. Dr. Harley considers that moderate smoking, in one accustomed to it, neither increases the amount of work nor retards the approach of fatigue. It perhaps slightly diminishes muscular power and hastens the onset of fatigue. Dr. Lombard holds that the use of tobacco has a powerful influence in this direction. Such experiments as these, even when no absolutely definite result is arrived at, are of importance, and if carried out with due precaution against error, in a large number of men, would undoubtedly constitute the most satisfactory basis on which a sound system of training should be carried out .-

#### Mouth Breathing.

The mouth is the entrance to the digestive rather than to the respiratory organs.

Mouth breathing is neither natural nor healthful, but nature has so provided, that when, through diseased conditions, the nasal passages are occluded, we may obtain air through the mouth.

The nose, however, is the entrance to the respiratory

Within the cavity of the nose are scroll-like bones, covered with mucous membrane, which greatly increase the surface of exposure in order to furnish the three special functions of heating, moistening and filtering the inspired air. The fact that mouth breathing is injurious is not sufficiently known. The air rushes into the lungs in such volume that its tem-perature is not regulated, its force is not controlled, it is in no way purified, and can thus easily give rise to diseased conditions of many kinds.

The winter season is the most prolific in the production of these resulting maladies, because of the difference in temperature of the external air and the body; ing easily read at a distance of ten to and among the diseases liable to arise are pneumonia, fifteen feet in the small styles, and at bronchitis, laryngitis, croup, etc.; whereas the same air taken normally through the nose, being prepared for its reception into the delicate lungs, simply fulfills the natural law, and no harm results.

The habit of mouth breathing generally arises from some obstruction in the respiratory tract, but may be prevented in most cases by timely care. Parents realize too little the importance of nose breathing. In the minor ailments of children, when the nose may be slightly obstructed for a time, it can still, by persistent effort, give full respiration; but because it is easier, the child breathes through its mouth and acquires more or less of the habit.

If there is obstruction at any time, it is particularly liable to occur at night, showing itself by restless sleep, heavy breathing, and a cross child in the morning. It is quite safe to say that when a child persistently breathes through his mouth there is something radically wrong. There are several forms of obstruction to free nasal respiration - thickening of the mucous membrane within the nasal chamber, due to repeated colds; the presence, between the nose and throat, of glandular tissue, normal in character but unnaturally developed; enlargements of the tonsils and glands of the neck.

Each of these conditions may be remedied by skillful treatment, and a child who has been restless and snoring may be made to sleep quietly and restfully.

Persistent attempts to breathe through the nose will often be rewarded by success, and prevent the development of the disease commonly called catarrh.

Catarrh itself is not a disease, but a symptom of ome obstruction or irregularity within the respiratory tract. It is much easier prevented than cured, while both are possible.

Keep your mouth closed and breathe through your nose.—C. Gurnee Fellows, M.D., in the Northwestern Sanitarian.

#### Weather and the Mind.

The psychology of the weather is suggested by Dr. T. D. Crothers as a promising subject for study. He says, in Science: "Very few persons recognize the sources of error that come directly from atmospheric eded conditions on experimenters and observers and others. tional treatment of this condition.—Maryland Medical by a rise at 5 P. M., after which a progressive fall takes In my own case I have been amazed at the faulty place during each successive hour until dinner. Even deductions and misconceptions which were made in during a prolonged fast more work was capable of damp, foggy weather, or on days in which the air was being executed from 11:30 A. M. to 4:30 P. M. than at 9 charged with electricity and thunder storms were impending. What seemed clear to me at these times appeared later to be filled with error. An actuary in a large insurance company is obliged to stop work at middle finger that, in corroboration of a well-known such times, finding that he makes so many mistakes which he is only conscious of later that his work is useless. In a large factory from ten to twenty per cent less work is brought out on damp days and days of threaten-This mixture may be applied alone or may be followed of performing more work. Sugar, taken internally, proving storm. The superintendent, in receiving orders to be delivered at a certain time, takes this factor into calculation,"

#### Correspondence.

#### An Induction Coll Phenomenon-Why does it Occur !

To the Editor of the SCIENTIFIC AMERICAN:

By holding a broken lamp to one of the secondary terminals of an induction coil, the glow can be increas ed by touching one of the primary terminals with the other hand. If the lamp is made to touch a primary terminal, it can be made to glow just as strongly as before, by touching a secondary coil terminal with the H. S. BURROUGHS. other hand.

Brooklyn, N. Y.

#### The Science of Rubbing.

No method of treating the various aches and pains to which the flesh is heir is more agreeable to the sufferer, or oftener effective, than a course of intelligent rubbing or massage

We may believe that the benefits derived are due to the personal electricity which is imparted from the body of the one who performs the rubbing, or we may say that a counter irritation of the superficial parts is set up by the friction. There are those who assert that it is the activity into which the parts in question are urged by the process that is of benefit. The last explanation is probably the most nearly correct.

But, however we may explain the fact, it is certain that even unskilled manipulation may be productive of relief and comfort to a wonderful degree; while if the manipulator is acquainted with the anatomy of the human body, his touch may seem at times almost magical in dispersing pain.

By tracing out an inflamed nerve it is possible for masseurs—as professional rubbers are called—to reduce the most troublesome of neuralgias, even to the extent of relieving the ever-dreaded and long-lingering sciatica. Muscles which refuse to contract, and joints which for a long time have been stiff, may be brought into renewed activity.

Of course, it is not possible for every one to show the skill of a trained masseur: but any of us can do much in an humble way toward relieving the sufferings of those who are dear to us.

We should always be careful to assist the flow of the blood in its course through the painful parts, as this fluid bears with it both food and strength. Whether a muscle, which is very often the seat of the pain, is tired and sore from overuse, or cramped and stiff from non-use, the soothing action of a fresh supply of blood is equally acceptable.

Nerves require more delicate handling, as they are often exquisitely sensitive to the slightest touch; but natient persistence and care are certain to be productive of greater or less relief.

It is not necessary in every instance to exercise so much delicacy, however, as there are many conditions which are more rapidly benefited by the vigorous use of a crash towel till the superficial parts over the seat of the trouble are aglow.

Circular motions, pinching, and slapping, all enter into the methods of a successful masseur.

Finally, the success of the treatment of pain by rubbing is to be found, not so much in the brute force exhibited in the manipulations, as in the gentle, educated touch which is able to recognize at once the requirements of the individual case.-The Youths' Companion.

#### New Candelabra for St. Paul's.

An interesting addition has just been made to the furniture of St. Paul's Cathedral, London, in the shape of two colossal bronze candelabra, copies of famous originals at Ghent. A curious history attaches to them. Cardinal Wolsey, when in the heyday of his power, set about preparing a sumptuous tomb for himself in the Wolsey (now the Albert) Chapel at St. George's, Windsor. Before it was completed his fall came. The sareophagus-of black marble-intended for the cardinal ultimately became the resting place of Nelson in the crypt of St. Paul's. The four giant candelabra by Torregiano, designed for the corners of Wolsey's sepulcher, were presented by Henry VIII. to old St. Paul's. Being covered with gold leaf, they were valuable, and a century later they were sold by Cromwell to the authorities of Ghent Cathedral, where they have remained ever since.-N. Y. Evening Post.

#### Long Distance House Moving.

A curious case of house moving was recently witness laughed at him, but he persisted. Rolling the house down to the river, he loaded it upon a seew and it was nal and circumferential joints are planed. soon at Olympia, a distance of about 60 miles. Then fore starting the house upon its unusual journey.

#### Margarin Compared with Butter.

BY A. JOLLES, MONATSCH, CHEM.

Various statements have been made as to the rela tive values of margarin and genuine butter as foodstuffs, the general outcome of which is that while there is not much to choose between the two as regards digestibility and nutritive value, butter has a slight advantage over margarin in these respects. The author has carried out a long series of observations with a dog fed during four consecutive periods with butter and margarin alternately; the urine and fæces being collected and examined for fatty matter, nitrogenous constituents, etc., so as to obtain the data for determining how much fatty matter passed unassimilated through the animal under each set of conditions as to feeding. In the first and second periods more fat and less carbohydrates were given; in the third and fourth, less fatty matter and more carbohydrates; the fatty matters being butter in periods 1 and 3 and pure margarin in periods 2 and 4. The various articles of food (wheatmeal, sugar, etc.) were carefully analyzed and made up into dog biscuits, so that the amounts of the different kinds of food constituents consumed during each period were accurately known. In this way it was possible to trace out during each period the proportion of proteids, fat, non-nitrogenous matters (starch, etc.), and mineral constituents (ash), which were either digested and assimilated or passed out undigested in the fæces. So far as fatty matters were concerned, 97 to 98 per cent was uniformly digested, whether butter or margarin; the figures obtained during the four periods respectively were as follows (in grammes):

	Period.			
	ř.	11.	ш.	ıv.
Contained in food	59°12 0°79 51°33 96°4	42°14 0°86 41°28 97°9	36°84 1°05 35°79 97°1	37:36 1:22 36:14 97:3

Hence the conclusion is drawn that under similar conditions of feeding, butter and margarin have practically identical coefficients of digestibility and nutritive value.

#### The Blackwall Tunnel, London.

A paper on this great work was read before the commenced with some interesting details of works of a similar nature which have been constructed in different parts of the world, and went on to say that the tunnel under the Thames at Blackwall, which is being eye and variety. What can be more monstrous than a built for the London County Council, under the direction of their chief engineer, Mr. A. R. Binnie, has now 1891 Messrs. Pearson & Son's tender for the construction of the Blackwall tunnel, amounting to £871,000, was accepted by the London County Council, and the work was commenced in 1892. Mr. D. Hay and the author were appointed as resident engineers under Mr. A. R. Binnie, and Mr. E. W. Moir took charge of the works for the contractors. The Blackwall tunnel is much larger than any tunnel yet constructed by the methods adopted. The outside diameter of the St. Clair tunnel, which is the largest one at external diameter.

The following leading dimensions were quoted by the author: Length from entrance to entrance, 6,200 approaches, flanked by retaining walls, 1,785 feet; cut feet; cast iron lined portion, 3,083 feet. The width of feet 11/2 inches. The tunnel is level under the river, and the gradient on the north side is 1 in 34 and on the south side 1 in 36. There are four vertical shafts, two on each side of the river, and varying in depth from 75 feet to 100 feet below ground level. Each shaft is a wrought iron caisson of 58 feet external diameter at the bottom and 48 feet internal diameter throughout, and lined with brickwork. Each caisson consists of two wrought iron skins, 5 feet apart, braced together, and terminating in a cutting edge. Two circular holes, which are temporarily plugged while sinking, are left in each caisson to give way for the tunnel through the shaft, and provision is made for an air-tight floor above the level of the tunnel when nec sary. The space between the two skins ed in Oregon: A man who owned a residence at is filled with concrete. Two caissons are in place, and ed, then dried with hot sawdust and coated with a Seattle, which cost him \$5,000 to erect, removed to the two others are in course of being sunk. The tun-Olympia and did not have sufficient funds to build nel is constructed of cast iron rings 2 feet 6 inches another house. He bought a lot and concluded to re- long, and each ring consists of 14 segments and a key move the building he owned at Seattle. Every one piece. The thickness of metal is 2 inches, and each segment has flanges 12 inches deep, and both longitudi- ed by water, can be made, according to Neueste Erfin-

The shield used for the construction of the tunnel is be had it rolled upon his lot and, strange to say, not a 19 feet 6 inches long, and is 27 feet 8 inches in external tine, 15 parts; indigo, in powder, 5 parts. Mix the timber was strained nor even a piece of furniture diameter. The outer shell consists of four % inch shellac, turpentine, and oil of turpentine, and place broken, although he had not removed the contents be- steel plates. The shield is divided into a front and in a waterbath, under gentle heat, until solution takes back portion by two vertical diaphragms at right place, and then stir in the indigo.

angles to its axis. It is thus possible, when necessary, to have a higher air pressure in the working face of the shield than in the completed portion of the tunnel. The space between these two diaphragms forms an air lock, both diaphragms, of course, being provided with doors, by which access to the working face is obtained. At the back of this air lock the shield consists only of the outer shell, which always laps over and outside at least one completed ring of the tunnel, and inside of which all the rings are built. The space of 4 inches left outside the rings when the shield is shoved forward is filled with grout, forced in by air pressure through screwed holes made in each segment for the purpose. Everything is quite solid at the back of the cast iron lining. At the air lock and in front of it there is an inner shell, connected stiffly to the outer shell by circular girders and in other ways, and both joining together at the cutting edge. The working face is divided into four horizontal floors and 12 working chambers by vertical and horizontal diaphragms in the line of the axis of the shield. A hanging iron screen in each compartment about 6 feet back from the cutting edge forms a safety chamber at its back, where men could stand with their heads above water in case of a rush of water in the face due to air blowing out suddenly or from other causes. Provision is made for using iron poling boards at the face, shoved forward by jacks, when in ballast, if necessary. The shield. which weighs about 250 tons, is shoved forward by 28 hydraulic jacks fixed at the back and butting against the cast iron lining, and able to exert a total pressure of over 3,000 tons.

#### The Passing of Red Brick.

In no department of human industry, says the Washington Post, has there been greater evolution of late years than in the business of making bricks. Formerly we had nothing but old fashioned red brick that reached its climax of perfection at Philadelphia, and was shipped thence at great expense all over the country where a high grade article was in demand. But the red brick has had its day for architectural use, and in its place has come to stay the brick of lighter hue-pink, buff, yellow, and, in fact, of nearly every

A brick can be made that is as mottled as a sea gull's egg, or one that will show the varying tints of an autumn leaf. It is done by adding certain metallic ingredients to the clay after the latter has been ground British Association by Mr. Maurice Fitzmaurice. He to the finest powder. It is the iron in the clay that gives the ordinary brick its deep red. In future most of our city residences are going to be constructed from brick of these pleasing colors. They give relief to the row of red brick houses? Washington is taking to the new style, and in this clear atmosphere, unspoiled by been under construction for more than two years. In the soot from soft coal combustion, a house of this beautiful material will stand fresh for a century and be solid years after one made of granite had disintegrated.

#### Mines of Wood.

A curious source of wealth is reported by the French consul at Mongtze, in upper Tonquin. It lies in wood mines. The wood originally was a pine forest, which the earth swallowed in some cataclysm. Some of the trees are a yard in diameter. They lie in a present, is 21 feet, while that at Blackwall is 27 feet in slanting direction, and in sandy soils which cover them to a depth of about eight yards. As the top branches are well preserved, it is thought the geological convulsion which buried them cannot be of great antiquity. feet. This total distance is divided as follows: Open The wood furnished by these timber mines is imperishable, and the Chinese gladly buy it for coffins. Along and cover portion, built of brick and concrete, 1,382 the coast regions of some parts of New Jersey there are trunks of cypress trees, deeply buried in the sand, roadway is 16 feet and the width of each footpath 3 the recovery of which forms a valuable industry, the timber being used for making shingles.

#### Simple Process for Bronzing Copper.

Mr. Mondit, of Caen, publishes a formula which is said to be capable of giving every tone from bronze to antique green, according to the length of time that the copper is allowed to remain in contact with the liquid. After the piece has been scoured, it is covered with the following mixture by means of a brush:

Pu	rt
Castor oil	Ü
Alcohol 8	
Soft soap 4	
Water	

The mixture is left on till the required shade is obtainvery dilute varnish.

#### A Blue Ink for Use on Glass.

A blue fluid for writing on glass, which is not attackdungen und Erfarhungen, as follows: Shellac, bleached, 10 parts; Venice turpentine, 5 parts; oil of turpen-

#### MULTIPHOTOGRAPHY.

to see ourselves as others see us, and affording opportunity for much range in the art of posing, is the mulsells. Thence the nuts fall into the first triturating illuminating purposes tiphotograph. If an image is placed in front of two machine, consisting of a pair of cast iron rollers, where

images will be produced; and at 45°, seven images; and if the mirrors are parallel, theoretically an infinite number of images will result.

In the process of photography which we illustrate advantage is taken of this to produce at one exposure a number of different views of the same subject. The person to be photographed sits with the back to the instrument, while in front of the face are two mirrors, set at the desired angle to each other, their inner edges touching. In the case illustrated these mirrors are inclined at an angle of 72°. Four images are produced. The exposure is made and on the developed negative appear not only the back view of the subject, but also the four reflected images in profile and different threequarter positions. The courses taken by the rays of light are determined by the law that the angle of incidence is equal to the angle of reflection. In the diagram we have

five images to the focal plane, the virtual position of through which the fine meal passes, while the coarse the subject proper.

reproduction of a photograph actually taken, where the interesting expression and marked characteristics of the face serve to bring into strong prominence the utility of this process for representing the human

It is obvious that simple as the process and idea appear, it might have many uses in the study of other forms of nature.

#### \*\*\*\* Pennut Oil.

The report of the American consul at Marseilles contains some facts concerning the manufacture of peanut oil, which is

largely coming into use for various economic purposes. Extraction of oil from peanuts is rapidly increasing. no fewer than seventeen factories being at present engaged in the industry, and the quantity of nuts imported at Marseilles for this purpose during 1893 exceeding by 314,000 metric quintals (69,224,400 pounds) the importation for 1802.

The general method of producing the oil is as follows: On arriving at the factory the peanuts are first placed in a machine of the nature of a "winnower," in which all outside dirt and other foreign substances are

removed. Having been thus superficially cleansed, A very pretty system of photography, enabling us the nuts are conveyed by an Archimedean screw to the



REPRODUCTION OF A MULTIPHOTOGRAPH.

mirror and back to the camera, giving a good idea of passes to another, where it is again ground finer, and Man Hartley, the hermit, was the sole inhabitant. the relation of the images to the subject and of the thence into a long hexagonal case forming a sieve, Hartley's death occurred, however, about two years the images being further from the instrument than is is sent back to the rollers again. The meal is then once world-famed mining town would be difficult to pressed in "scourtins" made of horse hair, a pressure find, while the lake itself is enchantingly beautiful. The gallery equipment for this class of work is shown of 2,850 pounds to the square inch being exerted and The lake is about a half mile in width and extends in one of the views, while the appearance presented by left on for an hour, which is sufficient to extract all along the depression of this mountain meadow a disa full length figure with the aid of the mirrors is shown that can be obtained in the first yield. The meal is tance of nearly four miles. Surrounding the lake is in another cut. A very interesting illustration of then removed from the "scourtins," ground a second a tract of level land comprising 40 or 50 acres, and the

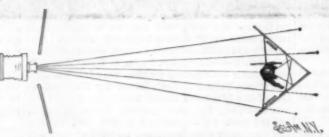


DIAGRAM OF THE PRODUCTION OF FIVE VIEWS OF ONE SUBJECT BY MULTIPHOTOGRAPHY.

and a second pressing is effected. If oil of a very fine the regular assessments which they paid on mines quality is required, the nuts are crushed only once, partially ground nuts yielding a smaller but finer product. The yield varies according to the quality of the nuts. Mozambique nuts produce about 50 per cent in the first pressing, and the value is from 70 f. to 95 f. per 100 kilos.; the second pressing yields about 12 per cent, the value of which is from 45 f. to 50 f. per 100 kilos.

The oil is largely devoted to the manufacture of white soap, for which it is highly prized. It is also colors.

used as salad oil and in the composition of margarin. Large quantities are also sold as olive oil, principally in the United States. A smaller amount is used for

The cake left after pressing is particularly rich in shelled nuts.

#### Meadow Lake.

Meadow Lake, which has such a wonderful history, is situated about eleven miles north of Cisco, Cal. There still remain portions of the old wagon road which was hewn out of the rock during those palmy days. At one time it was traversed by scores of freight wagons, and several trips daily were made with eight horse fourteen passenger stage coaches. The manager of the Colfax Sentinel recently made a trip on horseback. The old stage road was crossed again and again by the trail. In some places trees many inches in diameter have grown in the very center of the road. For the greater part of the distance the road is still in good condition, though in many places the stone walls have given away. At best the trip by stage to Meadow Lake must have been a wild one. At one time Meadow Lake had a popula-

traced the rays of light on their course from subject to arrangement rejected. From this machine the meal tion of 5,000. During many years subsequently Old ago. A more picturesque spot than the site of this what can be done by this process is presented by the time, heated to a temperature of about 70° C. (158° F.), whole is almost completely inclosed by rugged peaks.

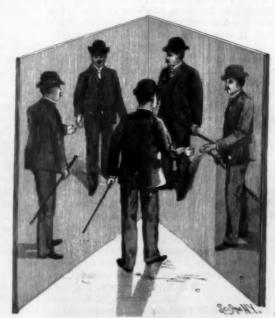
A score of buildings are all that mark this once busy city. The others have succumbed to the ravages of fire or been crushed by the heavy snows of this region Here at one time could be found fine churches, theaters, and dance houses, school houses, saloons, bakeries, breweries, banking houses, hotels, and a daily newspaper, and a mining stock board in daily session. The ruins of one stone building may still be seen. It was built by Perkins & Smith, of Brady City, Sierra County, at a cost of \$32,000. Many persons who have never visited the camp will remember it distinctly from the fact of

located in the camp for them.

Some persons who have never visited the camp are hasty in saying that the gold is not in the quartz. After visiting a half dozen ledges and prospecting the ore, the writer did not find a ledge that showed less than twenty colors to the pan. He even took a horn of the tailings that passed from the plates at the old California mine (formerly the property of Ralston) and secured from it more than a score of



GALLERY ARRANGED FOR MULTIPHOTOGRAPHY.



IMAGES OF A FULL-LENGTH FIGURE,

#### MR. MAXIM'S PLYING MACHINE.

Upon my return recently from the meeting of the British Association, at Oxford, I gladly availed myself of a kind invitation to visit Mr. Hiram S. Maxim, at Baldwyn's Park, Bexley, Kent, where for the past four years he has been experimenting with and perfecting what is usually called the Maxim flying machine, but were more correctly termed a soaring machine. Accounts of the experiments have been published from time to time, but the most complete and authoritative is contained in a paper recently read by Mr. Maxim himself at the above-stated meeting in Oxford. I send you a manuscript copy of this, which he has furnished at my request," and a photograph showing the machine as it appeared immediately after the famous experiment of July 31 last.

This paper renders it quite unnecessary that I should give any descriptive details; but no one who has not inspected the various parts of this huge soaring mechanism can fully appreciate the marvelous ingenuity and the truly scientific method brought to bear in elaborating the various details, which provoke admiration the more one studies them. The engine, the boiler, the numerous automatic devices for feeding and regulating the fire, the screws, the aeroplanes, the re-

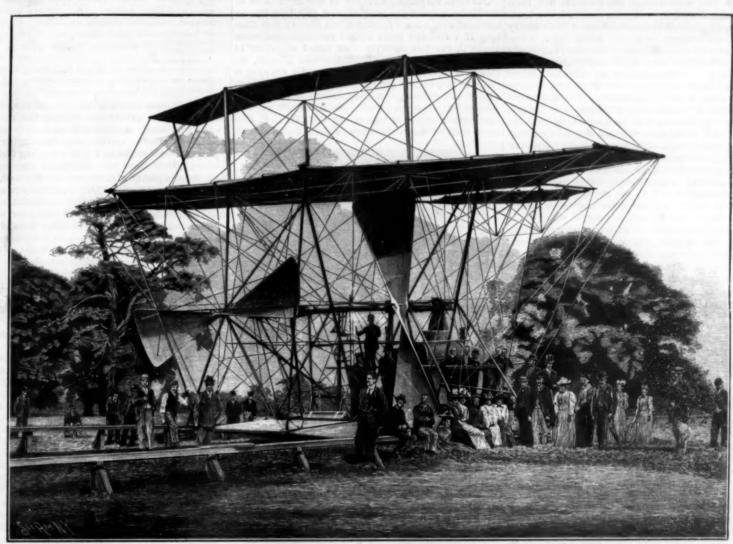
chine broke away, first by bending and breaking the rear axle and then by the forward retaining wheel on the underside of the left retaining guide breaking away. Being thus lifted away from the guides at three points, the momentum broke the heavy retaining timbers to the right, some of which became entangled in the framework (the engine being already stopped), and the machine embedded its wheels in the ground.

The lateral brasure made by the left forward wheel in breaking from the retaining wooden guide gives one a graphic idea of the power exerted, while the fact that the machine fell outside the guide to the right, without in any way affecting the iron traction rails within, is the best evidence that the machine was lifted from the ground just as described by Mr. Maxim. Hence, notwithstanding the accident, the machine was made to soar above the ground, and this was the first time in the history of the world that this feat was accomplished in the same way. The meaning of this accomplishment can best be appreciated by remembering that the machine, with water, fuel, and three men, weighed nearly 8,000 lb.; that the screws were 17 feet 10 inches long and 5 feet 2 inches wide, and that the area covered by the aeroplanes was some 4,000 square feet.

Mr. Maxim has thus demonstrated his ability to ditions will be far more thoroughly within control, and

making mechanical toys sustain themselves against the ceiling by rapid serew rotation on a vertical axis; and I cannot help feeling that had Mr. Maxim devoted as much energy, ingenuity and means to the application of power to horizontal screws, depending on these for his lifting power, and using aeroplanes as auxiliaries only, he might be to-day much nearer the end which he seeks. I venture this opinion after pretty careful study of the flight of various orders of insects and of birds, and after following pretty closely the mechanical experiments of the last thirty years.

Mr. Maxim, by his wonderfully ingenious boiler and motor, has solved the chief difficulty as to power, and ascertained many other important facts as to form of propeller, etc. Let him now perfect an adjustable and reversible screw, to be applied at first on the horizontal plane for lifting and then gradually to be brought to an oblique angle for propelling forward, and the next great problem is solved. Laterial dirigibility is easily controlled by cuneiform rudders fore and aft; while soaring power could be gained when once in the air by long aeroplanes of relatively narrow dimensions in the line of direction, to be held vertically in ascent and brought to the horizontal position during forward movement. Safe descent under such con-



MR. MAXIM'S FLYING MACHINE.

cording devices, in fact, everything about the mech-| soar by mechanical means on a scale which will per-| I am of opinion that it is along these lines that ultim anism has been beautifully done and represents great originality and inventive power.

The two dynagraphs are good illustrations in point. One of them indicated the lift off the hind axletree, the platform of the machine being so attached to the axletrees as to constitute a sort of weighing machine, and any change of weight resting on the axletrees be ing shown on the cylinder, which turns once round in 1,700 feet. The other not only recorded the lift on the forward axletree, but made a diagram which recorded the speed with which the machine was passing through the air.

It must not be forgotten that the mechanism in all its parts had been repeatedly tested at various steam pressures, and that the casualty of July 31 was really to its almost unanticipated lifting power under high pressure. Most of the test trips had been made with a lifting effort of not more than 8,000 pounds, a steam pressure of not more than 200 pounds to the pellers, and as the lifting power depends on the angle square inch, and a maximum rate of speed of 35 miles an hour, as it was difficult to stop the machine at a greater rate. But on the last test made Mr. Maxim raised the steam pressure to 320 pounds to the square inch, and the velocity and lift were beyond the holding power of the retaining guides, and the ma-

mit a greater lifting power than that necessary to ate success will be attained. carry the men and machinery, and there can be very little doubt that he will ultimately succeed in soaring through the air, and thus add, as he designs to, one of the most unique and most formidable engines of destruction in modern warfare.

But my visit only confirmed a belief which I have long held, viz., that the practical solution of aerial transit by mechanism is not to be found in imitating the soaring of birds, or other animals, but rather in imitating the fish and by use of adjustable screws, the inclined aeroplane to be used only as a means of reducing power when momentum is once attained. This would involve the use of a float in the form of bags of gagements with the Maxim-Nordenfelt Co. will perhydrogen gas to assist the vertical screw thrust as lift- mit, in devising improvements and means of overcoming power.

Mr. Maxim for lateral dirigibility depends on the slackening or stoppage on one or the other of his proof incline of his aeroplanes, there can be no use in reverse screw power. Hence the difficulty when once in the air of easy and safe descent. The management of the machine, in air, and the proper control and seknown variability in the wind gusts, must always be risky, if not absolutely unsafe.

I have been deeply interested from a boy in the sub-

The whole skeleton of Mr. Maxim's machine is made of cylindrical hollow steel tubing, manufactured in France. In future he proposes to use oval-shaped tubes, so as to offer less resistance to the air. Mr. Maxim has found that aluminum is useless and unworkable for his purposes.

There is a current belief that, deterred by the late accident, Mr. Maxim intends abandoning further experiment. All interested will be glad to learn that this is not so. I found the men under the intelligent superintendence of Mr. Roberts all busy repairing the breakages, and Mr. Maxim occupied, as far as his ening past difficulties.

Margate, August 24, 1894.

#### Connecting Metal to Earthenware.

The portion of the earthenware with which connection is to be made being unglazed, or the glaze having been removed, it is coated with plumbago, and curity of such vast canvas surface, with the now well placed in an electrolytic bath, whereby a firm metallic coating is obtained. The lead pipe is then soldered to this coating by a plumber's "wiped" joint. By this means are avoided the imperfect joints made with ject of aeronautics, and years ago amused myself in India rubber sleeves, washers or putty.

<sup>\*</sup> Mr. Maxim's paper is given in full in our Supplement of this week, No. 979, and in Supplement No. 976 will be found some twenty figures of

[FROM POPULAR ASTRONOMY.] THE PLEIADES. WH. W. PAYNE

As a group of stars the Pleiades has attracted more attention, in ancient or in modern times, than any lucid stars now appear. other cluster known to astronomy. When above the horizon the group is easily seen by the naked eye because of its definite outline and its bright and beautiful light. Long ago the sacred writer said of it: "Canst thou bind the sweet influences of the Pleiades?" Whatever that may mean, in fact or figure, it certainly cannot be less than the mystic reveries of those ancient untutored races who saw in them the the measurement of the distances and positions of all seven beneficent sky spirits of the Vedas and the Zendavesta, and the abode of Deity himself, became has been very carefully done three or four times durthe center of the universe. The time of the Pleiades ing the last fifty years, so as to obtain data for the was the beginning of the year for some primitive peoples; for others, the midnight culmination of the group was the sign for great feasts and royal mercy and favor for every petitioner. Even now savage Australian tribes dance in honor of the "Seven Stars," because they are good to the black fellows. They are called "the hoeing stars of South Africa, and their last visible rising after sunset is, and has been, celebrated with rejoicing all over the southern hemisphere as betokening the waking up to agricultural activity." The influence of the Pleiades has been widespread and unique in all time, and modern science has not yet set a limit to the wonders of their starry realm.

At the present time six stars of the group are easily seen by the naked eye. Their names are: Atlas, Aleyone, Merope, Maia, Taygeta and Electra. By referring to the accompanying plate these and others less bright may be readily identified. The two bright stars on the left hand side are Pleione and Atlas. Pleione is above Atlas and they are midway in the plate from top to bottom. Alcyone is in the middle of nard, then of Nashville, Tenn., observed this nebula the plate, with three little stars on the left and surrounded with a faint nebulous halo. The wonderful Merope is next and a little below. It looks somewhat like the nucleus of a telescopic comet with the tail pointing downward and to the right. The star and the nebula bear the same name and are wonderful objects. Notice the numerous parallel channels in that vast nebulous mass. Maia is next above, forming nearly a right-angled triangle with Aleyone and Merope. It is surrounded by a nebulous halo. A little to the right and above is Taygeta. The sixth bright star, Electra, is on the right side of the plate about midway from top to bottom. It has a nebulous streak from it to the left. Stronger eyes will see five more stars in the group. Pleione is one, the two stars by the one name, Asterope, looking as one just above Maia, make two usually harder to see by the unaided eye. The third is Celeno, nearly midway between Taygeta and Electra, and the fourth and fifth, not especially named, are seen respectively at the bottom and the top of the plate. Alcyone is a 3d magnitude in brightness, Electra and Maia are about 88 magnitude, Maia is 4th, Merope and Taygeta are not so bright as Maia by respectively a quarter and a half magnitude, and Celeno is a 7th magnitude.

The word Pleiades is from the Greek, meaning full or complete, so that it is not certain that the name limits the number of stars visible to the naked eye in ancient times, although the number seven is frequently applied to the group in such records. However, it seems probable that seven stars could be as easily seen in the past as the six that are now commonly visible. Professor Pickering suggests the probable explanation from a study of its spectrum that Pleione is the missing Pleiad, as its variable character might account for its fall to 62 magnitude. The record of naked eye observations on this group of stars is an instructive one. Moestlin in the time of Kepler saw 14 and mapped 11 with surprising accuracy. This was before the time of the telescope. Miss Airy, of England, has marked the places of 12. Carrington and Denning have counted 14, and Carl von Littrow spoke of seeing 16, and that 11 were frequently perceived,

An opera glass helps the eye amazingly in the study of the group in regard to color and number. Nearly one hundred stars come out at once on the astonished gaze, 25 of which are of the 7th magnitude or brighter, with many others less bright, and yet distinct enough to count with certainty.

In a region about A by 90', M. Wolf, in 1876, catalogued at the Paris nebulous mass. Aleyone seems to be separated from Observatory 625 stars to the fourteenth magnitude. the others except by a branch from its surrounding MM. Henry's sensitive plates showed in a smaller space 1.421 in 1885, and by four hours' exposure in 1887 involving the other three stars, and which can be the same space revealed the astonishing number of traced right through that nebula, as a line of light, 2,396, including stars undoubtedly as small as the sixteenth magnitude. The meaning of this statement may be more fully realized when we remember that the sharpest eye unaided can never see well, at one time, more than 2,000 or 3,000 stars. Before the time of telescopes the total number of stars that the ancient observers could see well enough for record was 1,100. The marvelous thing in the count on the Henry photo-

The accompanying plate covers a little smaller area than the Henry photograph just referred to, and our and although rather faint, when once seen, it will reproduction from the original negative has occasioned the loss of many of the stars plainly shown in making be added that the negative from which this plate was positives or pictures of any kind from the original photograph.

Another useful line of work on the Pleiades group is the principal stars from the central one, Alcyone. This ing the last fifty years, so as to obtain data for the study of the relative motions of these stars in order to learn something about the physical constitution of the group. Dr. Elkin, of the Yale Observatory, has also recently done some work of a similar kind by the aid of a fine heliometer, which is sometimes called a survey of the Pleiades by triangulation. His results are useful in getting the exact time of the occultation of stars in the group by the moon as she moves rapidly through it, by knowing the exact place of each star so o culted.

The most surprising advance in our knowledge of the Pleiades is the discovery of vast nebulous ma scattered over a large portion of the area of this cluster. If we except some earlier accounts that seem doubtful, the first observer that called attention to nebulous matter in the Pleiades was Tempel, an Italian astronomer, in the year 1859. His drawing is found in No. 5 of the publications of the Milan Observatory, and represents a hazy, comet-like mass surrounding Merope and extending southward from it to the distance of half a degree. In 1882 Mr. E. E. Bar-



The Pleiades Nebula and Trail of Asteroid No. 208 Pompeja.—From a photograph by H. C. Wilson at Goodsell Observatory January 30, 1894. Exposure 4 hours.

with a small telescope and made a drawing of it which was published in No. 3 of the Sidereal Messenger of that year. Quite generally, however, astronomers were in doubt in regard to the existence of this nebula, some claiming that search for it with first class instruments had been fruitless, while others maintained that its extreme faintness made its form and extent very uncertain. In 1886 the Henry brothers, of Paris, photographed the Pleiades cluster, showing plainly traces of the nebula that could not be mistaken.

In the years immediately following the study of the quality of photographic plates was vigorously pushed forward, until in the years 1888 and 1889 the highly sensitive film came into use, after which it became possible to get by the aid of such plates most wonderful details in nebular structure never before dreamed of. The strange and complex background of this cluster as seen in our picture is a good example of the progress in astronomical knowledge which has been made by the aid of photography in many di-

A few years ago the best telescopes visually gave small instruments. In this cluster the stars Alcyone, Merope, Maia and Electra are all involved in this vast nebula that makes a crooked path to the main nebula, to the star Electra. Another faint line of light may be traced through three stars above Alcyone which is nearly parallel to the streak just mentioned. Other work.

As we close this description of the Pleiades, we must lators being about four tons.

graph is the fact that 2° 15' by about 1° 30' of the space call attention to the little planet trail of Pompeja, asoccupied by the Pleiades group contains stars enough teroid No. 203, which will easily be found near the to fill the whole sky, if the 2,826 were brought near right hand lower corner of the plate. Its place is enough to us and sown broadcast in the sky as the three-quarters of an inch from the bottom and about one fourth of an inch inward from the right hand side. The trail is about one-sixteenth of an inch long, afterward be recognized at a glance. It ought also to made also contained the trail of another asteroid, which was detected on it by the careful scrutiny of Dr. Wilson, of Goodsell Observatory. The last-named asteroid proved to be a new one; so Dr. Wilson has been credited with the discovery of it.

#### The Fall in Prices.

The American Grocer, in its twenty-fifth year anniversary number, publishes the prices of leading articles of food compiled from its market reports for twenty-five years. The prices given are wholesale prices, and the changes are quite remarkable, as illustrated by the following table:

	1869.	1904.
Flour, per bbl	\$6.62	\$3.30
Sugar, per lb		.04%
Coffee, per lb	.1576	.18%
Tea, per ib	.59	.90%
Rice, per lb	.0094	.0436
Meas beef, bbl	11.41	8.19
Mess pork, bbl	31.04	13.80
Lard, per lb	.1816	.0796
Butter, per lb	.2534	.9514
Cheese, per lb	.14	.10%
Canned tomatoes. No. 3, doz	2.10	.95
Canned corn No. 2, dog	2 75	.80
Canned peaches No. 8, doz	3.50	1.30
Canned salmon No. 1	3.75	1.55

The only item which is higher now than in 1860 is coffee, and this article has, during the twenty-five years, fluctuated between 9.01 and 19.72 cents per pound. The coffee market is just emerging from a period of high prices and is now tending downward. Dairy products have also fluctuated largely and are now above a parity with other articles of food, but the tables of the American Grocer, which are given for each of the last twenty-five years, illustrate quite as marked a tendency toward lower prices for nearly all varieties of food as is seen in other lines of produc-

The all-rail rate on grain from Chicago to New York, which was 70 cents per hundred pounds in 1860, is but one-third that amount in 1894. The rate on live stock and dressed beef was 95 cents in 1872 and 45 cents in 1894. Dry goods from New York to San Francisco in 1860 paid \$6.50 per 100 pounds and in 1804 one-half that sum. Carloads of fruit from California to the Atlantic seaboard cost \$4.20 per 100 pounds in 1800 and \$1 per 100 pounds in 1894. Dry goods from New York to Chicago were charged \$1.50 per 100 pounds in 1869, 75 cents!in 1804. In 1860 the N. Y. C. R.R. averaged over 2 cents per ton per mile on all its traffic, while the average now is 7 mills per ton per mile; the Illinois Central charges have in like manner fallen from 21/4 cents to 9 mills per ton per mile, and the Louisville and Nashville from 3 3-10 to 1 cent. Ocean freights have fallen in equal measure. Wheat which paid 13 cents per bushel from New York to Liverpool in 1869 is now being carried for 41/4 cents. Inventions, machinery, and competition have done it.

Within twenty-five years the national debt per capita has been reduced from \$64.48 to \$12.55, a steady decrease which, in connection with increasing population, has made the burden of taxation comparatively

In 1869 the government paid in interest \$3.32 for each inhabitant, while that charge in 1898 was only 34 cents. On the other hand, the sense of the nation's obligation to the survivors of the civil war was so great that the charge for pensions was increased from 78 cents per capita in 1869 to \$2.37 in 1893.

The net ordinary receipts of Uncle Sam in 1869 were \$9.82 per capita, against \$6.91 in 1893.

#### Storage Battery Traction in Paris.

The accumulator cars, which have been running for ome time on the lines of the Northern Tramways Company, of Paris, appear to be proving fairly satisonly hints of what we now photograph easily with factory, as the cost is reported to work out at about the same as horse power on the Paris lines. The cars are arranged to seat fifty-two persons, and run at a speed of about 73/2 miles an hour within the city limits, which outside is increased to 10 miles. Inclines of about 4 per cent have to be mounted at certain parts of the line, and each car runs 80 miles a day. The motive power is supplied by a battery of 108 cells, having eleven plates each. These cells are fitted into twelve They are coupled in four groups of 27 cells cases. each, the electromotive force of each group being similar features can be seen on the original negative, about fifty volts. The groups can be arranged either but mention of them here is not necessary in order to in parallel or series, so that a wide range of speed is at give the reader a good general idea of the beauty and the service of the driver. The two motors which drive excellence of photographs that can be made at the the car can also be coupled in series or parallel. The present time with instruments adapted to such kind of total weight of the car, with accumulators and passengers, is twelve tons, the weight of motors and accumuTHE FORT WAYNE ELECTRIC CORPORATION-ITS magnetic circuit. One of our illustrations shows one sale and price. "That last pinch of the screw," said a DYNAMOS AND GENERAL ELECTRIC LIGHTING AP-PARATUS.

The Fort Wayne Electric Corporation has, during the last year, attracted considerable attention by its secession from the General Electric Company. Originally it was one of the members of this consolidation, which includes the Edison and the Thomson-Houston companies. In carrying out the combination it was proposed to close the Fort Wayne works and make the apparatus at Schenectady. This was opposed by the president of the Fort Wayne corporation, and, as a result, it left the consolidation and is established on its own responsibility again. The works are of large size, occupying some twelve buildings in Fort Wayne, Ind., the buildings practically covering a large block of ground. Eleven years ago, the Fort Wayne Jenney Electric Light Company occupied a single small build ing. The present great concern is the outcome of this building, and its president, Mr. R. T. McDonald, it is interesting to note, was one of the organizers of the original company, whose charter dates from the fall of 1881.

At present the company is engaged in the manufacture of apparatus under the Wood patents, Mr. James J. Wood, the present electrician of the company, being the inventor. The apparatus manufactured includes all the details as well as the generating apparatus for are and incandescent direct current and alternating current lighting, and our illustrations show not only some of the great dynamos made by the company, but also some typical pieces of apparatus which illustrate the minor feature

We illustrate in Fig. 1 the Wood automatic dynamo, designed for are lighting by direct currents, one of the ing the box breaks the circuit on both sides, so that standard sizes for this machine being for eighty 2,000 the fuses can be examined with perfect safety. candle power lights. This machine possesses the Wood automatic regulator, which perfectly controls the action, enabling the machine to give a constant current ing or other circuit. This operation is effected by an automatic shifting of the brushes. We illustrate an experiment shown in which the machine is absolutely short circuited without producing any disastrous results, a brilliant are appearing at the point of connection. Another test is throwing on or off fifty or more lamps at once, which can be done with the production of scarcely any sparking on the commutator. The experiment in short circuiting we illustrate as performed with the 80 are light machine alluded to above, and in another cut, Fig. 2, we illustrate the giant constant current 125 are light machine. On this appears very distinctly the automatic regulator. To one side is seen one of the workmen producing a long metallic are by drawing apart metallic terminals connected to this machine.

duced by the factory is the great 6,000 incandescent light alternator given in Fig. 8 of the illustrations. The general construction of the dynamo proper is shown in the cut. It is directly connected to a 300 horse power Ball cross compound engine. The field is of cast iron, with radial pole pieces projecting inwardly, in whose ends slots are cast to prevent Foucault currents. The winding of the pole pieces is compound. Back of the main dynamo and driven by a belt upon a shaft will be seen a comparatively small direct current dynamo. This is the independent exciter. A current from it is taken to the field, carried by comparatively fine wire wound in four coils on the field pieces of the alternator.

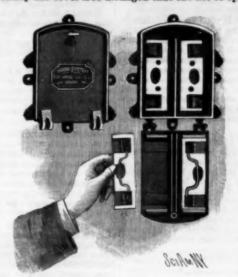
One of the most striking pieces of apparatus pro-

The shaft of the alternator carries next to the armature face a commutator from which a rectified or direct current is taken to the field. Heavier wires wound upon the field carry the rectified current. The result of this system of compound winding is that the dynamo is self-regulating. Outside of the commutator on the shaft arc seen the two collecting rings, whence the alternating current is taken to the line. The armature of the alternator is made of sheet iron stampings, and its winding is composed of copper ribbon. A field of 51,-000 lines of force per square inch is maintained, and three and six-tenths feet of armature conductor per ALTERNATING CURRENT volt is employed. The efficiency of the machine is 95 per cent. It makes 240 revolutions per minute.

The alternating current is recognized as peculiarly adapted for are lights, as it insures equal combustion of the positive and negative carbons, and the Fort Wayne Corporation makes a specialty of the full are plant of this type. The transformer made by them, also due to Mr. Wood, possesses several special features. Mica insulation is used. The cores are wound by ma chinery, in doing which mechanical counters are used to determine the number of turns of wire to maintain the desired ratio of reduction. When the correct number of turns is reached, a bell rings to notify the operator. After the coils and cores are stacked up, they are placed in the iron case. This is a cast iron box provided with a number of projections on its inner surface to prevent the coils lying against its side, so as to insure ventilation. An opening at the bottom admits air, and a weather-proof cap at the top covers nection with the cores so as to form a portion of the the hardness of the American cake militates against removed.—A. Gentzsch, Vienne.

which is seen the primary fuse box.

This embodies several new features. The fuses run determining the point of fusion, so that if a fuse blows out, the contacts are not injured. As a measure of safety the cover is so arranged that the act of open-



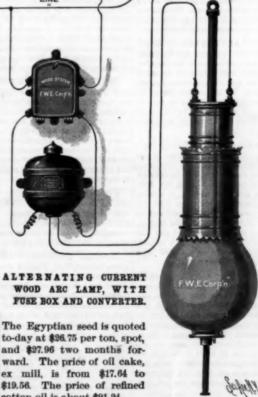
THE WOOD FUSE BOX.

In the near future the Corporation is expected to enter the field of electric railroad work. In this event it is fair to assume that some important developwhatever changes of resistance may occur on the light- ments may be looked for in this department, where so much work has already been done by others.

#### The English Cotton Seed Oil Industry.

Lorin A. Lathrop, Esq., United States consul, Bristol, England, in a report to the State Department, says: There are a considerable number of seed-crushing mills in England, nearly all of which crush cotton seed. None of these mills have any connection with the American Cotton Seed Oil Company of the United States. They are independent of each other and of any controlling organization whatever.

They obtain their entire supply of cotton seed from Egypt. From 15,000 to 20,000 tons are annually imported into the Bristol district. Cargoes are purchased through London brokers, who guarantee weight. The freight from Alexandria to the port of delivery runs at the present moment from \$1.94 to \$2.19 per ton.



and \$27.96 two months forex mill, is from \$17.64 to \$19.56. The price of refined cotton oil is about \$91.24.

Egyptian cotton seed comes unmixed with fragments adherent fiber is either handled or stored.

of the lamps connected with the converter, above man to me, "is what hurts the cakes. You don't want to pave the floor with them; you want to feed them to cattle." The oil expressed from the seeds finds a cross porcelain blocks, in whose center is a depression market in the soap factories, in the fish-frying shops, and in the Mediterranean.

> Protection of Fruit and Vegetables in Transit. A bulletin which has just been sent out by Professor Mark W. Harrington, Chief of the Weather Bureau, gives the opinions gathered from many shippers of perishable products throughout the country in relation to the proper protection of fruits and vegetables by heat and cold during transportation. These men generally concur in the statement that the danger in transportation from freezing has been eliminated by modern methods. The so-called lined car, which has a partition of tongued and grooved boards at the sides and ends, placed so as to leave an air space of about four inches, answers for spring and autumn and during most winter weather, while the Eastman heating car in extreme weather has proved a perfect protection. Perishable goods can be shipped with safety in ordinary freight cars when the outside temperature is twenty degrees Fahrenheit, and in refrigerator cars when it is ten degrees. Fruit wrapped in heavy brown paper will endure fifteen degrees more cold than if it is not so wrapped. Dampness is very injurious, and products which are shipped in a dry condition can endure a much lower degree of temperature without injury than under moist conditions. It should always be remembered that the kind of packing which keeps out the cold will keep in the heat, so that there is often

#### Ornamenting Glass.

more danger from heating by process of decomposition than from injury by the cold. When a north wind is

blowing on the prairie, cars which contain fruit are

often covered with canvas on the north side. Oranges

that have been frozen may be thawed without injury by

putting them in cold water or in tight barrels immedi-

ately after arriving, allowing them to thaw out gradu-

ally. These are some of the points picked almost at

random from what is altogether a most instructive

BY A. GORLITZ, ZURICH.

circular.

The design or inscription is first engraved on a printing plate, for which rubber is a suitable material; the design being engraved positively, that is to say, in the same way as that in which it will be afterward seen. The plate is then coated with varnish color and pressed upon a glass plate. The glass plate is strewed with bronze powder, sheet aluminum or other suitable material, the portions forming the design or inscription remaining empty, and being, therefore, transparent. The glass plate is then placed in a frame having a backing of strong paper board, on the front face of which is mounted a brilliant sheet of tinfoil or tin plate, provided with prominent squares placed in suitable positions. The design is thus shown by a brilliant reflected light visible through the transparent part of the glass, the other portion of the glass forming a backing stamped in relief.

Heretofore raised enameled writing and designs in relief on glass have been produced by means of a brush and thin enamel paint. The inventor uses stencil plates, preferably of tinfoil or other flexible material, and a composition made of glass powder, made up to the consistency of treacle, with turpentine and "glaze." The composition is applied with a spatula through the openings of the stencil plates, and the article is then fired. If the surface on which the design is to be produced is irregularly curved, or is curved both ways, the stencil is applied to sized paper, and the design is transferred from the damped paper to the glass or ware.

## Liquid Fish.

Fish are reduced to small pieces, mixed with a suitable quantity of water and cooked in a close vessel by means of steam, the temperature being raised to 160°-170° C. When all the soluble parts have been extracted by the water, the liquid is first passed through a sieve, and after skimming off the fatty matter, it constitutes the fish essence, which may be used as food, either alone or in conjunction with other nutritious substances. The waste parts of the fish, together with what remains on the sieve, are used for manure, after being first mixed with a suitable amount of lime, clay, or similar dilnent.

#### Insulating Material.

Ozokerite, asphalt, and amber are subjected to disof cotton fiber. It is therefore easier to handle than 'tillation in a closed still to a temperature of 400.° After the American seed. There is a further important con- the mass has been heated until gases, vapor, or oils sideration: Insurance is a great tax upon seed-crush- cease to escape, it is allowed to cool. In that condition ing mills, and I understand that the premium is con- it is of pliable consistency, and may either be used siderably enhanced where the American seed with its alone or incorporated with other substances for insulating eables, such as resins, fats, or oils, the propor-The seeds are crushed undecorticated. The oil cake tions of these being from 30 to 70 per cent. By this mits air, and a weather-proof cap at the top covers has not, therefore, the excellent appearance of the method those substances present in fossil resins which another opening. The iron box is in magnetic con- American cake made from the decorticated seed; but prejudice or deteriorate the insulating properties are

#### RECENTLY PATENTED INVENTIONS Engineering.

BLOWER - Thomas Kitson, Stroudsburg, Pa. This is an improvement which may be ap plied to an ordinary furnace without changing or re-newing the grates, enabling an even steam pressure to be-kept up with the use of cheap fuel. It comprises a pipe with bell-shaped mouth through which extends a steam nozale delivering in the pipe, an approximately conical valve being secured to the nozzle and held with-in the mouth, the valve being adjustable in and out upon the nessle to permit the passage of the requisite quantity of air. The device is of simple construction and adapted to create a very strong draught.

#### Hailway Appliances.

CAR COUPLING .- John J. Schairer, Clint, Texas. This improvement comprises a knuckle pivoted in the drawhead and provided with cam surfaces on opposite sides of its pivot, an arm mounted to swing being adapted to engage the cam surfaces to open and close the knuckle and to lock it is either open or closed position. The improved coupling is of simple ong construction, designed to prevent accidental uncoupling, and permit of coupling without the brake-man going between the care, while also adapted to the ng of cars of different beights.

CAR COUPLING.-James O. Miller, Rochester, Ind. According to this invention the draw-head is arranged to rock laterally in contact with a sup-ported spring-cushioned yoke piece, there being a slidable spring-retracted drawbar whereon the drawhead rocks and slides, while a spring-pressed arm vibrate in a side slot of the drawbead, a pivoted link swing-ing laterally thereon. A hook having an elongated limb is pivoted in an opposite alot of the drawbead, a spring throwing forward the limb of the hook. Cars provided with this coupling are automatically coupled as they come together, the uncoupling being effected from either side, and the device may also be used in connection with the ordinary link and pin coupling.

EXPRESS CAR. - Miguel Morell and Ramon M. Ferrer, Santa Barbara, Cal. This is a bur-glar-proof car with cages which can be opened only from the outside, to contain safes and valuable parcels, and accessible only to the depot man at the station to which consigned. If robbers enter the car they will be exposed to the fire of the messenger, in a bullet proof compartment, which is so arranged that the mes may also protect the engineer and shoot along the sides of the car without exposing himself.

#### Electrical.

CUT OUT.-Elmer E. Hersh, Denver. Col. This device is more particularly designed for elec-tric cars, and comprises a revoluble cylinder over the face of which extends a series of fuse wires introduced in succession between contact springs connected with the conductors as the cylinder turns, the fuse wire melting and the circuit being broken when the current exceeds the prescribed strength. Buch motorman is preferably supplied with an extra cylinder fitted with fune wires, so that when all the wires of one cylinder are melted, it may be easily replaced by a cylinder containing a full set of wires.

#### Mechanical.

MECHANICAL MOVEMENT. - William W. Beaumont, London, England. This invention com-prises a spindle journaled in bearings on a suspended device, a rotatable link being connected with the spindle, and an unbalanced weight on it. It is especially de-ragned to impart a gyratory motion to sieves, such as cliters in flour mills, coal screens, machines for sixing and sorting grain, etc., to advantageously replace the ordinary crank mechanism, avoiding excessive wear and

WIRE FORMING MACHINE.-Frank H. Howe, Port Townsend, Washington. This is a machin for forming rods or wires from metal disks or plates. rotary spindle carries the disk from which the rod or recary spindle carries the dank from which the road or wire is to be formed, a fred mechanism feeding the disk to rotary cutters for cutting the strip, which passes between drawing rollers, whereby the disk-carrying spindle is rotated, the drawing rollers and cutters being destinated to the strip of the strip of the strip. onely operated by gearing. The disk is thus continuous strip of wire or rod of any desired

#### Agricultural.

PLOW. - Thomas J. Kelly, Tolosa, Texas. The share of the plow designed by this inventor is readily and quickly removable, being connected with the shank of the beam and with the wing or other support by a locking connection not involving the use of bolts. The handle of the plow may also be readily ad fraced to suit the plowman, and all braces and other sally located at the back of the wing, o share, or land side, are dispensed with, thus allowing plow to run free. The clevis also is of peculiar seruction, being adjustable as to position to bring the team into desired draught, and a single or double tree

PULVERIZING CULTIVATOR.-Henry Strasser, Thornburg, Iowa. This is an improvement on a formerly patented invention of the same inventor, each construction that two teeth-carrying rs may be located at angles to one another and adjust able upon a yoke, to accommodate the cultivator to rows of varying width. A double cultivator is also so made that either one of the sections may be used as a single cultivator. A simple and inexpensive attachment facilitates the adjustment of each section upon the yoke, and the teeth are adapted to thoroughly pulverise the ground and effectually remove weeds.

born, Gilbea, Ind. This is a construction capable of ready attachment to the box body of any wagon, the harvester, as it is advanced along a row of corn, strip-screw threads after having been disconnected therefrom ping the ears from the stalks and delivering them at | for longitudinal adjustme

the rear, where the ears are stripped of their husks and silk and the husked ears delivered to an elevator to be conveyed to the box of the wagon. The driving shaft is driven from the axio of the vehicle, and pivoted in the main frame is a working frame, in an inclined forward slotted end of which work longitudinal spiral rollers, over one of which are stripping bars moving in opposite directions. At the rear open end of the working frame is an endless apron, adjacent to which are the husking rollers, the faces of which may be either smooth

COW MILKING MACHINE.-William B. Bland, Maquon, Ill. This is an improvement on a for-merly patented invention of the same inventor, simplifyng the construction and improving the action of the nilking fingers, the means of adjusting the fingers and their carrying frame to different positions, the main frame and driving mechanism remaining the same. The milking fingers consist of a series of leaf-like spring leaves provided with tension devices designed not to injure the surfaces with which they come in contact, and resembling in their action the pressure of the fingers of

DRAUGHT EQUALIZER.—Henry Sturm, Nauvoo, Ill. This invention relates more particularly to four-horse eveners for use with either right or left tongue, or tongueless gang plows. The evener devices are so arranged that the plows can be drawn to work close up to the ends of the field, the front draught being changed to right or left to take more or less is and allow more space for the horse in the furrow wi out crowding others. The construction is simple and in expensive, and the several parts can be readily assem-bled and adjusted, and easily replaced in case of

#### Miscellaneous.

CABLE GRIP FOR LOGGING, ETC .- Gilbert Gagnon, Nanaimo, Canada. In the use of this de-vice the drag or resistance of the log or other object beng hauled, and also the draught of the cable, are util-sed to hold the jaws closed on the cable. The body of the device has a fixed jaw and is formed with a roun rface on its under side to act as a runner, a rearwardly extending arm carrying an idler around which the rope asses, while a movable jaw is pivoted on a lever ful-rumed above the fixed jaw, and a rope connects the ver with the log or other object to be hauled.

PRINTING PRESS .- Daniel Maurer. Middle Village, N. Y. In this press the type bed is held in vertical position when the press is being operated, but may be given a rearward inclination to facilitate securing the type in a frame or chase on the bed. The platen is plyoted, and held normally in such position that it will bear against the frame of the type bed through the medium of springs, the operation of a hand lever causing the platen to approach the type bed with a nple and wor ent. The contruction is sh parts may be readily replaced.

DRYING MACHINE. - Peter Cooper ewitt, New York City. This is a machine particular esigned for spreading melted gine or gelatine into shee designed for spreading metal gine or quastic into sheets and drying and delivering it in commercial form, and the invention consists in an endless apron supported on druins and traveling through an evaporating chamber heated by stea no rhot air, there being also a device for cleaving the dried sheet of gine or gelatine from the apron as it emerges from the machine. The flow of liquid glue to the apron is regulated according to the speed of the apron and the evaporating power of the air assing through the evaporating chamber. The machine made of different lengths to adapt it to drying films of different thicknesses without produ cing bubb

FIBER DRYING APPARATUS. - Willy Saulmann, Berlin, Germany. An apparatus for condi-tioning textile fibers has been devised by this inventor, providing means whereby a dried and heated current of air is passed through the fiber-holding receptables, the latter being surrounded by hot air, so that the textilo fibers come in direct and indirect contact with the hot air current. The weighing of the receptacles takes place not during the conditioning itself, but after its termination and the cooling of the recepta-

ALUMINOUS CARE. - Jean V. Skoglund. Brooklyn, N. Y. This cake consists of sulphate of alumina, ferrous iron, an excess of a stannous compound and a stannic compound, and the invention provides for making it by reducing aluminum sulphate free from ferric iron by treating the crude material, as bauxite, with sulphuric acid to dissolve the aluminum oxide and the iron oxide, adding a weaker reducing agent, such as sulphurous acid or a sulphite, then heating the solution, and finally adding any stannous compound, and con-tinuing the heating until all of the ferric iron is reduced. The product is especially suited for the sizing of paper pulp without darkening or reddening the pulp.

COMPOSITION FOR TANNING.-Jesse B. Hodges, Salem, Ark. Extract of palmette root, stra-monium, gambier and salt, in stated proportions, with water, form this patented composition, with which it is designed to tan light hides in two days, and the heaviest hides in twenty days, at a cost of about three cents per pound to the tanned leather. The hides are to be limed, tain twice as much tannin as oak bark, and that extract can be made therefrom for much less than oak bark extract.

BIT STOCK. - Francis M. Hay, Erie, Pa. According to this invention, there is an elastic or yielding screw connection between an outer sleeve and the stock proper, the screw connection having a slot or channelway across its threads, so that a screw seg-ment may be slid longitudinally therein to close quickly the jaws, and the other slaves then turned with a rotary cound and effectually remove weeds.

CORN HARVESTER.—Winfield S. Osgive a final clamp to the jaws. Special means are proYork City. This pole is made of a metal tube or pipe, and into its rear end extends a metallic bar fastened to the solid wood base of the pole. The base is fitted into a recess in the hounds, where it is secured by rivets and top and bottom plates, and the head, carrying rings, is formed of two flanged sections secured in the end of the pole. This pole is comparatively inexpensive, is not liable to break or bend, and is not flexible,

BRIDLE BIT.-Max Lesser, Duncansby, Miss. To facilitate managing an unruly animal and prevent him from breaking loose when hitched to a post this inventor has devised a bit comprising cheek pieces and a main mouth bar cranked between its ends and having a surface groove throughout its length, while an aux-iliary mouth bar pivoted in the cheek pieces has a crank and lies wholly within the groove, there being operating cranks at the ends of the auxiliary mouth bar. There are slides on the cheek pieces linked to the end cranks, and levers pivoted to the upper ends of the cheek pieces

VEHICLE SEAT CORNER IRON.—Charles C. Field, New York City. An angular body is, according to this invention, fitted into the corner formed by the side and back of the seat, an inwardly projecting flange resting on the seat bottom, while a top portion has a flange adapted for engagement with the outer faces of the seat back and one of the sides, being so curved as to avoid forming an angle at the corner. The iron is readily applied, and is inexpensively made in a single piece.

PACKAGE.-Marion J. Meeker, Puyal-This is an inexpensive containing bops, fruit, vegetables, etc., not liable to leak out of small apertures, the package also being readily transformable into a cot bed, and, when made of water proof material, suitable for use as a portable bath tub. Combined with a pair of poles is an attached sack of such width that it may be slipped over the ends of the poles, thus fastening the ends of the sack, trestles being nployed when the device is used as a bed, box or bath tub, and looped cords preventing its spr unted on trestle

REFRIGERATOR. - George A. Green, Rogers, Texas. A cooler for preserving milk, batter, etc., constitutes the improvement designed by this inventor, which operates by the evaporation of water, whereby the contents of the cooler may be kept at a lower tem perature than that of the outside atmosphere. The water-holding receptacle has a covering of absorbent material hugging the bottom and entering into the water, while a dish-like water-holding cover has also a cover-ing of absorbent material whose ends adhere to the coverof the body, and a drip receptacle is located beneath

CHECK ATTACHMENT.-Robert Sears. wark, N. J. This is a device for use in connection with an overdraw check to hold the horse's head in nation to prevent choking and keep the animal under ontrol. It comprises a bowed frame with rearwardly extending arms, a nose band having its lower ends connected with the rear upper ends of the frame, and chin strap having its ends connected with the frame at a point in advance of the nose band, the frame being adapted at its front end to receive an overdraw check. In the use of the attachment, the lowering movement of the animal's head causes pressure on the nos; and chin straps, but avoiding bruising or pinching

ACCOUNT KEEPING DEVICE,-Ernest McCulley, Houston, Mo. In a flat-topped case, with de-tachable name cards on one side, is held a series of paper strips, there being a roll for each depositor in a bank, this device being especially designed for use in keeping bank balances. The strip may be readily pulled along from the roll so that succeeding balances may be easily written on it, the balances coming near the name of the depositor, that they may be easily seen.

STRINGED INSTRUMENT. - John Con ery, Long Island City, N. Y.—This is an instru the mandolin type, and the invention provides such as the mandom type, and the invention provides such as instrument having an attachment whereby the instrument may be played after the manner of a violin, by drawing a bow back and forth. The strings are arranged over a convex bridge, by which they are held concentric. with a slotted convex guide secured to the top of the instrument, the bow being adapted to move on the guide and having pins or teeth which project through its slot

FOLDING SNOW SHOE.-Hermann Bremer, Halberstadt, Germany. This shoe is made in two sections, with adjacent overlapping ends, the parts being joined by a pivoted lever or turning class to form one connected piece, and the relative arrangement be as to give the resiliency of a spring to the joint,

BOTTLE STOPPER. - Gilbert L. Mat thewa, Newton, N. J. This is a stopper for bottles hold-ing gaseous liquids, the pressure of which holds the stopper in place. It is very cheap and simple, comprising a button inclosed by an elastic gasket, the shank of the button being pivoted on the bent lower end of a wire loop, curved portions of which spring apart and engage the sides of the bottle neck

TRUSS.-Carl B. Rostel, San Francisco, plunged and handled in vais in liquor made with the composition. It is cizimed that the palmetto roots condominal rupture, the belt being adjustable to suit the size of the person, and being provided with pads having an elastic pressure device whereby the tension is adjust able to any part of the pad and to any degree strength. It also has relieving pads to prevent sorones

#### Designs.

CENTRIFUGAL MACHINE CASING .-Henry B. Weiper, Durand, Wis. This is a circular casing with upper opening somewhat contracted, and with bottom raised at the center for most of the diameter of

BASE FOR A GAME APPARATUS, -Frank

VEHICLE POLE.—Edward Clark, New ork City. This pole is made of a metal tube or pipe, which extends an arm like the trail of a gun carriage, a h extends an arm like the trail of a gun carriage, a alot in this arm opening tuto the cylinder.

> Note.—Copies of any of the above patents will be furnished by Mnnn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

#### NEW BOOKS AND PUBLICATIONS.

THEORY AND CONSTRUCTION OF A RA-TIONAL HEAT MOTOR. By Rudolf Diesel. Translated from the German by Bryan Donkin, New York: Spon & Chamberlain. 1894. Pp. viii, 85. Price \$2.50. No index.

This monograph describes and explains the theory of an internal combustion engine. The principle on which the engine is based is that coal or other combustible, when burned, produces so high a temperature that a large excess of air (100 parts by weight to 1 part of the ombustible) is essential to utilize the heat. The author bjects to discharging it at a high temperature from the exhaust, and properly recognises the water jacket as a great source of waste. The theory of the motor is worked out in the greatest detail, and the work is illustrated by a very full series of figures and plates. On general principles, the want of an index is to be regretted. The Diesel motor is now being tested in Germany, using atomized petroleum for fuel. The petroleum in question, the translator states, is "pulverized," rather a peculiar adjective to apply to a liquid.

F. B. VANDEGRIPT & Co.'s HANDBOOK OF THE UNITED STATES TARIFF. Containing the Customs Tariff Act of 1894. New York and Philadelphia: of 1894. New York and Fin. 547. F. B. Vandegrift & Co. Pp. 547.

This convenient sized book, with very full schedule of rticles and rates, contains the new tariff law, and will be found a most useful manual for all interested in commerce between this and other nations. In one thing it is open to criticism. The extensive use of ditto marks in the alphabetical schedule sometimes causes a large num-ber of pages in succession of the index, for such it really is, to be printed without the initial word, which should, of course, have been repeated at the top of each page.
Thus, under iron and steel, ditto marks run for some ten pages, so that on opening the index anywhere between pages 371 and 382 it is wholly problematic what the ditto mark refers to, and this can only be ascertained by guess or by turning back a number of pages. The same trouble appears elsewhere. The work, however, is so complete, portable, and well arranged that otherwise we warmly mend it.

STATISTICAL SUPPLEMENT OF THE EN-ATISTICAL SUPPLEMENT OF THE ENGINEERING AND MINING JOURNAL. The mineral industry, its statistics, technology and trade, in the United States and other countries, from the earliest times to the end of 1899. Vol. II. Edited by Richard P. Rothwell. New York: The Scientific Publishing Company. 1894. Pp. xxx, 894. Price \$5.

The Department of the Interior of the United States, in its publication of reports on the mineral resources of the United States, has done excellent service. The present volume to a certain extent carries out the system of the government work alluded to, but on a much enlarged scale, and is far better printed, and with more detail. It will be found a most useful work, and one which any one interested in these topics will be E'kely to make frequent interested in these topics will be leaving feature of the book is the publication of the portraits of contributors, with abstracts of their lives. It is the second volume, by which the subject is carried down to the end of 1893, and we believe that a new annual volume is to be looked for, which will make the publication one of the most important scientific works of the day.

LESSONS IN QUALITATIVE AND VOLU-METRIC CHEMICAL ANALYSIS. By Charles O. Curtman. Including les-sons in qualitative chemical analysis by Dr. F. Beilstein. Saint Louis, Mo.: John L. Boland Book and Sta-tionary Co. 1894 Pr. vii 993. Price tionery Co. 1894. Pp. xii, 295. Price \$1.50.

This work is designed principally for the use of medical students and physicians, and like all books written under such restrictions, may seem a little inadequate for its subject, but we do not hesitate to say that, even by se who have gone through a more with one of the larger works, this will be found an excellent reminder of their studies.

INDUCTION COILS AND COIL MAKING. By F. C. Allsop. New York: Spon & Chamberlain. 1894. Pp. xi, 162. Price \$1.25.

Mr. Allsop's books are characterized by their practical aspect. In the present work a very good description with numerous illustrations of the construction of induction colls is given, and one which will be found of interest by many electrical constructors, especially amateurs. is illustrated by a number of figures, some newer than others, some being advertising cuts. On the whole, the subject is not treated as fully as we would like, but it cannot but be of use, and deserves notice as a notable addition to electrical literature,

MODERN METHODS OF SEWAGE DIS-POSAL FOR TOWNS, PUBLIC INSTITU-George E. Waring, Jr. New York: George E. Waring, Jr. New York: D. Van Nostrand Company. Lon-don: Sampson Low, Marston & Com-pany, Limited. 1894. Pp. vi. 252. Price \$2.

Mr. Waring appe ers once more before the public treating of one of his favorite topics. In his graphic and decisive way he unhesitatingly criticises things generally, which he considers to be wrong, giving his views with a strong and decided expression. By his advocacy and de-velopment of the Moule draining process, which as ap-M. Whiteman, Canton, Olio. This is a design for a dovice by which a ball may be thrown or tossed by a plied in this country has received his name and is kn

as the Waring system, his name has obtained wide cur among suburban residents. He himself, on pag 215, says that the term "Waring system" is a misnomer. He says that it would be better to call it Mr. Field's aysicm. But the author's qualifications for speaking of sew-age, sewage irrigation and sewage farms give the book an especial value and a peculiar timeliness at the present day, when suburbs are known to offer so important a field for the work of the sanitary engineer. An excellent in ex is an important feature of the book.

CAVALRY LIFE IN TENT AND FIELD. By Mrs. Orsemus Bronson Boyd. New York: J. Selwin Tait & Sons. 1894. Pp. 876. Price, cloth, \$1.

This excellent account of cavalry life in the America This excellent account of cavalry life in the American any will, no doubt, make interesting reading for many. The preface alone, describing the trials of Captain Boyd, the hasband of the authoress, at West Point, in itself decribes a curious episode in West Point life. In the apadix, written by Richard H. Savage, the sa is referred to, and the Infamous persecution to which as a boy the authoress' husband was subjected at West Point is described. Not the least interesting part of the book is Mrs. Boyd's description of her own life in re field, and the trials which she has been obliged to go

BEFORE THE GRINGO CAME. By Ger-trude Atherton, New York: J. Sel-win Tait & Sons. Pp. 306. Price, cloth, \$1; paper, 50 cents.

Eleven stories of old California in the days before the incovery of gold, gathered from different magazines, make up this work, which will, no doubt, be found inter esting reading for many.

Any of the above books may be purchased through Send for new book o lished. Munn & Co., 361 Broadway, New York.

# SCIENTIFIC AMERICAN

# BUILDING EDITION

#### SEPTEMBER, 1894.-(No. 107.)

TABLE OF CONTENTS.

- An elegant plate in colors, showing a Colonial residence at Portchester, N. Y., recently completed for Geo. Mertz, Esq. Two additional persp views and floor plans. An attractive design. sign. Mr. Louis Mertz, architect, Portchester, N. Y.
- 2. Plate in colors showing a residence recently com-pleted for R. H. Robertson, Esq., at Southampton, L. I. Two perspective elevations and floor plans. A picturesque design and an admirable model for a seashore cottage. Mr. R. H. Robertson, archi-tect, New York City.

  8. Residence of Frederick Woollven, Esq., at Rosemont,
- Pa. Two perspective elevations and floor plans A neat design in the Colonial style. Cost complete \$4,800. Mr. J. D. Thomas, architect, Philadelphia.
- 4. A cottage at Roger's Park, Ill., recently erected for Edward King, Esq. Two perspective elevations and floor plans. A unique design. Mr. Geo. W. Maher, architect, Chicago, Ill.

  5. Cottage at Hollis, L. I., recently completed for the German-American Real Estate Co. Two perspec-
- tive elevations and floor plans. Cost complete \$3,200. Mr. Edward Grosse, builder, same place.
- Perspective elevation with ground plan of Saint Gabriel's Chapel, recently erected at Hollis, L. I. A unique and most excellent plan for a small chapel. Cost complete \$6,500. Mr. Manly N. Cutter, architect, New York City.
- Two perspective elevations and an interior view, also floor plans, of a residence recently erected at Orange, N. J., for Homer F. Emens, Eaq. Mr. Frank W. Beall, architect, New York City. A pleasing design in the Colonial style.
- rspective elevation and floor plans of a cottage recently erected at Flatbush, L. I., for F. J. Lowery, Esq. Cost complete \$4,000. Mr. J. C. Sankins, architect and builder, Flatbush, L. I. 9. A residence at Yonkers, N. Y., recently completed
- for Mrs. Northrop. A very unique design for a hillside dwelling. Perspective elevation and floor plans. Mesers. J. B. Snook & Sons, architects, New York City.

  10. Club House of the Sea Side Club, Bridgeport, Conn.
- A good example of Romanesque style. Perspective elevation and floor plans, also an interior view. Messrs. Longstaff & Hurd, architects, Bridgeport,
- 11. A residence at Hinsdale, Ill., recently erected for C. E. Raymond, Esq., at a cost of \$7,000 complete. Perspective elevation and floor plans. Mr. J. H.
- on, architect, Hinsdale, Ill.
- The Castle of Bonnetable, Half page engraving.
   Miscellaneous Contents: The trrigation of laws, illustrated with two engravings.—Viaduct for etreet railways, Cincinnati, Ohio, illustrated.—The fireproof building construction of the New Jersey Wire Cloth Co., Illustrated.—Silvester's remedy against dampness.—Palmer's "Common Sense" frame pulley.-"The Old Hickory Chair," illustrated.—An improved hot water heater, illustrated.

  The Caldwell Tower, illustrated.—The American Boiler Co.-The "Little Giant" floor clar trated,-The Akron air blast furnace.-La glaze.—The "Piqua" metallic lath, illustrated.

The Scientific American Architects and Builders Edition is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming, practi-cally, a large and splendid MAGAZINE OF ARCHITEC-

#### Business and Personal.

The charge for Insertion under this head is time Dollar a lime for each insertion; about eight words to a line. Adver-tisoments must be received at publication office as early as Thurniay morning to appear in the following week's issue

"U. S." metal polish. Indianapolis. Samples free Shorthand by mail by W. G. Chaffee, Oswego, N. Y. Ill. catalog tools, Me. Frasse, 19 Warren St., N. Y. Handle turning machinery. Trevor Mfg. Co., Lockort, N. Y.

We make absolutely a perfect loose pulley oiler. Krid-ler Mfg. Co., Grand Rapids, Mich. Send for circular.

Distance Reading Thermometers.—See illus. adver-disement, page 130. Ward & Doron, Rochester, N. Y

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York.

Centrifugal Pumps for paper and pulp mills. Irrigating and sand pumping plants. Irvin Van Wie, Syracuse, N. Y. Split Pulleys at Low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y.

Competent persons who desire agencies for a new popular book, of ready sale, with handsome profit, may apply to Munn & Co., Scientific American office, 361 Broadway, New York.

#F Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Hooks referred to promptly supplied on receipt of

Minerals sent for examination should be distinctly marked or labeled.

(6248) W. S. F. writes: In a late number of the Scientific American, vol. 70, page 86, there was published a formula for solidifying petroleum, pressing into blocks and baking it. This product was in-tended for burning, and it was stated that it had many advantages over coal. I followed out the formula, and got the oil in a solid state. On baking it, however, it all crumbled to pieces, rendering it of course unfit to handle or transport it, and on burning it a very dense, black smoke was emitted. Will you please give me some ad-vice on this subject? A. Possibly you baked at too high a temperature or for too long a time. Try the additisawdust and clay.

(6249) E. J. asks how to get the gear of a bicycle. A. Count the teeth on the two sprockets. Divide the number on the large or crank shaft sprocket by the number on the driving wheel sprocket and multiply the diameter of the driving wheel by the quotient.

(6250) L. V. H. says: Will you give me a formula for sticky flypaper? A. Reain 1 pound, mo-lasses 314 ounces, linseed oil 314 ounces. Boil until thick enough. 2. Also how to treat old files with acid, so they will be partly useful again? A. Boil the files in strong soda and water to clean off all grease, oil or gum. Then dip for a few minutes in a bath of nitric acid 1 part, water 4 parts; the length of time being less on fine files, as your experience may suggest. 3. Will you also state if there is any difference in the working power of a windmill, in hot or cold weather, the barometer pressure and velocity of the wind being the same at each trial? A. There would be little, if any, differ

(6251) H. C. S. asks how to make a stage dimmer for 30 or 40 lights alternating current. A. Use No. 6 or 7 wire made into a coll with a movable minat.d core. The size required depends on the fre-

(6252) S. T. W. asks for a receipt for making a cement that will cement paper, canvas or leather to a wood or iron pulley to keep belts from slipping. A. Scratch the face of the pulley with a rough file thoroughly, so that there are no bright or smooth places.

Then swab the surface with a solution of nitric acid, 1 part; water, 4 parts; for 15 minutes; then wash with the surface with a solution of nitric acid, 1 to an alternating current, and offers such great resistance to a continuous one? A. Water is no more conductive, boiling hot water. Having prepared a pot of the best tough glue that you can got, stir into the glue a half the object in having such great variations in the resistounce of a strong solution tannic acid, oak bark, or ance of telegraph instruments, being gallnuts, as convenient to obtain, to a quart of thick ne; stir quickly while hot and apply to the paper or glue; stir quickly while hot and apply to the paper or pulley as convenient, and draw the paper as tightly as possible to the pulley, overlapping as many folds as may be required. By a little management and moistening of the paper, it will bind very hard on the pulley when the paper, it will bind very hard on the pulley when the paper, it will bind very hard on the pulley of cars operated at once. dry, and will not come off or get loose until it is worn out. Use strong hardware wrapping paper.

with fine engravings, illustrating the most interesting examples of Modern Architectural Construction and allied subjects.

The Fullness, Richness, Cheapness, and Convenience of this work have went for it the Language Tengentality of the Modern Architectural Publication in the world. Sold by all soverheads and Publication in the world. Sold by all soverheads and Convenience of the Modern Architectural Publication in the world. Sold by all soverheads are first to make them stiff and glossy. A. Starch, 1 concerning the most interesting the most interesting to use on collars, cuffs, and shirts to make them stiff and glossy. A. Starch, 1 concerns and abroad, enable us to understand the sund subjects.

Richard To INVENTORS.

An experience of nearly fifty years, and the preparation of more than one bundred thousand applications and shirts to make them stiff and glossy. A. Starch, 1 concerns and abroad, enable us to understand the sunds at bone and abroad, enable us to understand the subjects.

Richard To INVENTORS.

An experience of nearly fifty years, and the preparation of more than one bundred thousand applications and sentity to understand the starch of the starch with the starch of the starch of the Language of the Language

the starch and use while hot. Sufficient bluing may be the starch and use while not. Sumesent sitting may be added to the water, previous to the boiling, to overcome the yellowish cast of the starch, if necessary. Sperma ceti may be used in place of paraffin. Starched linen car only be properly finished by hard pressure applied to the

(6254) C. H. T. says: Will you kindly AND EACH BEARING THAT DATE. let me know in your Notes and Queries of a cheap fixa-tive for charcoal drawing? A. 2 tablespoonfuls of rice boiled in 1 pint or 1½ pint of water; strain, and pass the drawing quickly through the liquid; use a large flat dish for the liquid.

(6255) G. W. C. says: Will you please give me the formula of a solution to remove corns? A Caustic potassa, 1 drachm; alcohol, 1 fluid ounce. Mix in a stoppered phial, and agitate until solution is complete. The corps are either moistened with the above or a small piece of lint, or rag, of the size of the corn, is moistened with them and then bound on, care being taken, particularly with the last one, that the liquid do not touch the surrounding parts.

(6256) J. G. R. asks: 1. How many cubic feet of hydrogen and how many cubic feet of oxy-gen gas can I get in one hour by decomposing water with a battery of 3 volts or 10 volts? A. The gases generated depend on the amperage, not on the voltage di rectly. The voltage of course is concerned as being the cause of the amperage, the latter depending on the voltage and the resistance of the circuit. 2. If water is de composed by passing steam through red hot iron tubes, is the oxygen free or will the oxygen units with the iron t A. The oxygen unites with the iron, and hydrogen only is evolved. 3. If water is heated to such a degree that it will decompose through heat only, will not the mixture of gas unite with a terrific explosion as soon as they are se the heat is over its kindling po ated (becau A. The gases will unite when the temperature falls below the point of dissociation. They may however be separated to some extent by diffusion through a potcelain disphragm. 4. Is a living milk white raccoon more valuable than when of common color? A. We should imagine so. Address some menagerie or dealer in wild animals.

(6257) F. W. W. asks: 1. With a current of 500 volts, how to make an electro-magnet that will lift 1000 pounds. That is, the size of helix and of core, and size of wire. A. You should say "potential of 500 volts"—a volt is not a unit of current. A magnet core two inches thick and two feet long would answer. Wind with 20 or 30 layers No. 24 wire; use at least 20 pounds of wire. For magnetic traction calculations and others see Sloane's "Arithmetic of Electricity," \$1 by mail. 2. Suppose a bar of soft iron were to be placed so as to rest as an armature upon two or more electro-magnets, would the bar become a magnet throughout its length of equal power as magnet? I presume this would depend on distance between magnets. If so, how far apart may the magnets be placed and retain uniform power of magnet throughout length of bar? A. By placing two north net throughout length of bear? A. By pacing two north or two south poles in contact with the bar, you can establish consequent poles in its center; the whole bar will show some polarity, but the center will show the most. S. At what distance from such a magnet would its power be available? You will confer a favor by answering the above. A. Distance reduces the power of a magnet very rapidly. At an inch the attraction would be greatly reduced. No exact answer can be given.

(6258) J. N. P. asks how to separate gold from rubber and the materials to use. It is pure er, used to clean from my work waste gold leaf, that I use. A. We would suggest metallic mercury to remove and save your gold. An amalgamated copper plate might be used. Scrape off the amalgam from time to time, distill off the mercury, and gold will be left.

(6259) W. J. H. asks what effect an inductive load has upon the speed of a Shallenberger meter, such as is used in houses on incandescent light circuits. Westinghouse A. C. system. A. The Shallen berger meter indicates the amperage of the current, Anything which reduces the current will reduce its speed.

(6260) H. S. B. asks: What is the potential necessary to cause a spark of ½ inch? A. Perhaps 12,000 volts. No really reliable figure can be given.

(6261) C. B. W. asks: 1. How much No. 96 magnet wire is required to give 50 ohms resistance? A. Allow 2-35 feet to one ohm. Multiply the ohms desired by this, and the product gives the feet— 117.5 feet in your case. 2. How many lamps are required to be placed in a circuit to have a motor run from 100 v. peres if the motor is wound for 50 volts? A. You must give the amperage of the mot required for the motor, use four 100 volt lamps in par-

(6262) W. J. W. asks: 1. Why is peroxide of manganese, also chloride of lime, placed are the carbon in the Leclanche cells? A. To act as a depolarizer and dispose of the hydrogen which tends to ac-cumulate on the carbon. 2. Does it make any difference if a zinc rod is used in place of a sheet, and which is best? A. A rod is less liable to corrode and fall into pieces than a sheet. One is as good as the other from the electrical point of view. 3. Why is water so conductive ance of telegraph instruments, being all the way from 20

#### TO INVENTORS.

#### INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted September 25, 1894,

y a-	AND	BACH	BEAR	ING	THAT	DA	ATE.
ce	[See n	ote at end	of list abo	out copi	er of the	so pat	ents.]
he	Advert Air shi Alarm.	p, D. Hurll See Fire	oing tag, A	. S. Te	rrill		596,800 596,804
5e	Anima	r or support trap, J. R. trap, C. A. ter, F. B. G	OSS	o. Pur		10,10,	500,599 894 560
A.	Anima Atomia Auger,	post hole,	tesler Mosure &	Warne	· · · · · · · · · · · · · · · · · · ·	******	526,526
m-	1 PSBCEW	ater trap at	MI VEIVE. I	B. W. H	ALIGNE	*****	526,649
ve ia	Bag, W Barrel	dee Water I . H. Field. pitching ap , follower on wash, J. H. rap, J. Mar z, ball, P. U thes clamp, ll, C. W. St. . manufact	paratus,	G. Schr	altt	16,504,	525,548 536,980
ng	Barrels Basin a	dollower ind valve o	for brine, perating	C. C. W	estther	efor,	526,474
es	Basin t	rap, J. Mar	quis	dr	**********	*****	536,968 536,480
	Bedclot Bell, ca	hes clamp	H. L. Je	men	**********		526,490 536,417
y	Belting	, manufact	ure of ro	and leas	her, Drus	onky	526,617
y- er	Bicycle	ll, C. W. St , manufact chjerling C. H. Scott support, V s, shield f	et al V. H. Scot	t			596,689 596,548
n- li-	Botles	enck	or knotte	er mag	m boller	. 2.	536,463
he	Boiler,	enck See Section H. H. Keffe urnace, J. caling pre- T. B. Smit	Grogan		········	*****	526,575 506,485
lt-	Boiler s	caling pres	rentives,	water p	ressure fo	oder	596,543
e-	ESCORE,	COAGL TOL II	nemoranna	COLUMN TRANSPORT	es slip, V	V. M.	806,397
1 ?	Box fas	g machine, tener, A.	A. Werne V. Jones.	OP.	Trolley		596,491
ly it	bracke.	tener, A. V. See Inches. Trois See Car gon brake.	ey and fe	ed wire	bracket.	wire rako.	
re	Bread o	on brake.	paratus	for the	manufa	cture	
re )?	Of a Buggy	erated, J. ( tops, lever	hilds	ent for	raising or	low-	826,877
W	Buildin	tops, lever g, J. B. Ato g mat, con topper and	posite, D.	Neale			886,480 886,457
ed	Burner	Merecenter	shittent be	an, sen	Hydroos	rhon-	806,464
a- le	Camera		tographie				
0,	Camera	era. shutter, G	A. Wate				506,471
							11,443 536,513
-1	Car brai	ee AllE can heumatic to ke, S. G. W ke, automa pling, McP pling, H. A b slot brake rd, J. H. Je ster, street tching devi	tic, J. C. I	eyerle	**********	*****	20285,2884
at of	Car cou	pling, McP pling, H. A	bail & Ko . Winters	picke	*********	*****	523,550
n	Car grip	rd, J. H. Je	nnings	T. Mai	TEB	*****	526,453 526,533 536,567
on T	Car nwii	ster, street tching devi tibule, W. sting indi-	ce, street	J. Bra	utigam		526,481 536,540
d ls	Cars, to	sting indicates	nator for	electr	to railwa	, T.	806,044
ns l	Card ele	thing, app	aratus for	sottin	g toeth is	a, M.	
g. et	Card for	eyeglass older, G. T.	bains, E. Beeland.	J. Figh	0F		536,584 536,533 536,431
8,	Case. S	ee Medicir	e or samp	ole case	. Show e	ABB.	596,396
M	Cash re	obins.  obins, app  sberg-Deire  r eyeglass c  lder, G. T.  see Medicir  gister, indi  ker  sea lscreen  see Tea cb  W. P. Bend	cator, and	d recor	der, Land	in &	506,403 886,638
dy	Chest.	gal screen See Tea ch	est. Du	dley			
Z-	Churn,	W. P. Bend Coyne & St	annon				596,607 596,561
h	Clamp. Clamps,	See Tea ch W. P. Bend Coyne & Sh phter, G. W See Bedch manufact	othes class	ap.	hinding		526,496
11	Heyi Clocks,	nen	or adjusti	ng the	heat of per	ndm-	595,443
4	Coal scr	F. Kroeber	Cross				596,560 596,563
e	Conduct	nen apparatus f f. Kroebei een, G. W. atrolled ma or support er, C. W. M sack carries	and insul	ator, D	N. Osyon		526,580 108,498
y	Conveye Cotton	er, C. W. M sack carries	iller	hns			136,406
0-	Countin		M. Kidde	grape er	roots, e	18000	506,400
	Coupling	g link, A. L	amplougi	ng. Th	Goodrich	18.	896,637
9	Curtain	g. See Sha g link, A. I. iron heater rod supports of alkal tin	t, H. Ben	olt	king. C.	P. J.	506,371
£,	Vaut	ining glass or	other su	rfaces,	J. Budd.		606,503 506,558
O	Dental t	ool sterilis	I. A. De i	atus, Z Raismo	T. Sailer		506,558 506,463 506,519
0	Carte	g crude tu	rpentine,	appara	Che Tor, I	L. O.	696,613
-	Doll, F.	B. Schults.	Pronty	tor, as.	Clements		596,667 596,650
-	Door loc	k, sliding,	W. Lash.	Rice			526,403 526,636
T t	Door, se Draught	if-acting, (	C. F. Kau	1	**********		526,461 526,492
-	Draw ba	g crude two g spirits, a B. Schults. B. Schults. nger, T. C. k, sliding, erating dev if-acting (c r regulator, r attachme guide, Tam steam, L. I steam vacus, s, excavat	ent, M. J. ner & Bur	Hoey	**********		526,527 526,509
L	Dredge, Dredge,	steam, L. I	num, L. H	шаноу.		U500, 6	36,530
	Bate	M Lindho	Orm, usc.,	Cutter	EUP, AA	···· 5	596,514 601,577 606,568
-	Dynamo	M. Lindho voltage re s from car	gulator, N	L. P. R	der		66,568
-	Bidd	e surfaces	machin	e for	Snishing.	P. 5	36,438
1	Shell Elastic f	c surfaces enback abric, A. St light circui sill & Tinde il apparatu	raus			5	26,689 26,546
8	MeNe	ill & Tinde	F	ering in	ebanism	ror, &	36,579
-	gan	enositing o	s, com-co	W. K.	Brideman	S	26,388
1	Elevator Engine.	epositing a table, J. 6 See Motos continuou	. Smith	Steam	engine.	B	36,488 36,505
2	Engines, H. D.	See Motor continuous and means fo, H. I. Schoor, T. P. Stole rack, E. See Elastium and in free means for the see and free means	s cut-off	egister	for steam	. C. 8	886,363
8	stean	a, H. I. Sch	anck	ang cri	me-throw	S	06,584
•	Extensit	or, T. P. Stelle rack, E.	W. Leach	£	*********	b	28,641 26,450
-	Fabrics,	machine f	or raising	the su	rface of t	0X-	06.491
1	Faucet, Fence, P	irup jar, F	H. Lippi	ncott		S	26,421 26,578 26,500
-	Fence, w	ire, Berkes cel, Krame	& Lesch.	man	**********	S	26,494
-	Filter, O. Fire alar	P. Briggs m, J. P. W	Hiams		**********	5	26,515
8	Fire eaca Flashligh	t burner, 1	M. D. Wes	toott		661, 5	26,386 26,662
	Fruit gat	herer, A. I	loughton furnace		**********	60	26,648 26,67 <b>4</b>
	Furnace, Furnace.	A. Bryce. F. B. Gies	er		*********	50	96,612 96,524 96,657
1	Furnace,	A. H. Woo	rodruff	*******	**********	55	36,657 36,475
1	Thiel	draught	regulating	appai	ntus, G.	L. 80	26,419
1	sion o	, apparatu fair to, G. e joints, d	L. Thiell.	rrollin	g the adu	50	06,510
							26.615
6	lame app	paratus, W	A. Barne	100	*********	50 50	86,500 86,564 86,373
6	lames, a	pparatus foremating	or playing	C. A.	Clark.	50	6,460 6,516
6	arment	supporter, her meter,	G. W. Fer	rolled,	8. Simpoo	Q., (9)	16,460 16,516 16,522 16,640
6	earing f	ctrical safe paratus, W ard, C. B. B pparatus for cremating supporter, ber meter, or imparting ty, T. H. R ting tool biting oven, seaner, faum	ushton	ottal me	otion in a	NA- 01	
6	lass bea	ting tool h	A. O. Hur	ley	unger	60	15,418 16,444 16,588
6	bined,	J. F. Hatt	ield	and al	water, ec	60	6,628 6,610
0	rate her	iter, porteb	le open, J	Lawle	or	50	20,4900
1	un sight	ting oven, aner, fans J. F. Hatfarator, W. ster, portabut, quick fit, H. Strand. P. Water, pneumatic power, A. See Door I Lehman.	wold	******	*********	52	16,407 16,588 16,598 16,306 16,370
1	lammer,	power, A.	Beaudry.	0		50	6,870
1	Larp. L.	Lehman.	E Witter	rolley	wire pang	er. 50	16,690 16,600
E	larveste	See Door I Lebman . r, corn, E. rs, twine b . A. A. Rau	ox and ta	nation f	or self-bir	1d-	15,000 15,450
		The same					

222
Hay loader, J. F. Platt.         58.1           Hay press, J. N. Santwood.         50.4           Hay rabe, B. F. Smith.         50.4
Hay loader, J. F. Piatt
Weatherbee.  Horses from cribbing and wind-sucking, device for preventing T. Redmond.
Hone to couplings, apparatus for applying, P. Whyto. Hot water heater regulator, J. K. Meschier. 135,6 Hotel register, D. F. Rieele. 135,5 Hydrocarbon burner, Olo & Bower. 585,5 los cream freezes, R. L. Weston. 135,5
Hose to couplings, apparatus for applying, P. Whyte Description, P. Whyte Description, P. Whyte Description, P. Whyte Description, P. Whole Description, P. Whole Description, P. Whole Description, P. W.
Interfoculing survey output, B. W. Sweet
Joint for and method of Joining metal bars, W. M. Brown. Knife burnishine machine, G. B. Kellsy.  Sh. E. Levis.  Lace fasteneer, tied abo., T. E. Lewis.  Ladder and ironing board support, combined step and extension, A. Goneer.  Ladders, trolley support for M. Croissant.  Sc. G.  Lamp, J. A. Halley.  Lamp J. A. Halley.  Lamp J. Cherke.  Level, blumb, H. & S. Follard.
Lock and latch, combined, J. Murdie
Measure, scale, E. Karsobner Measuring instrument, electrical, H. Herberts. 188,46 Medicine or nample case, F. C. Gundlach. 186,48 Milk can or analyseous reconstants. F. C. J. Bosto.
may marbino, F. M. Leebner 38,55 Mirrors, manufacturing, A. J. Klock 38,55 Mirrors, manufacturing, A. J. Klock 38,56 Mixror machine, C. Rippin 48,55 Mixing machine, C. Rippin 48,56 Mixing machine, C. Rippin 58,56 Mixing ma
Music box, Paillard & Sueur. 484,49 Music leaf turner, C. H. Nadig 384,53 Neck protector, H. A. Labi 486,53 Opening metal receptacies, means for, F. C.
tence.  Packing, metalite rod, F. J. Cole.  Paddiswheel for boats, W. H. Knapp.  Padlock, G. M. Hathaway Patiers, garment fitting, S. Christianess. 368,376, 35,309 Pattern, alevee, S. Christianess. 368,376, 35,309 Pen, fountain, P. E. Wirk.  Penholder, A. H. Stefl.  Penholder tubes, mackine for forming, H. S.  Grannis.  Photographic camera, roll holding, D. H. Hous-
Findingraphic emissis, roll soluting, D. M. House to
Franciagrapose camera, ron soluting, D. M. stone 100.  Files From teredo, etc., composition fo preserve 195, 280 Sheet metal pipe. Pipe. See Sheet metal pipe. Pipe and nut wraceb, combined, G. W. Thomas. Platon removing device, D. B. Sullivan
Piters, W. A. Bernard. 198.475 Filers, catting, W. A. Bernard. 198.405 Filers, catting, M. L. McLassghin. 198.405 Fress. See Hay press. Frinding on gians, etc., apparatus for, A. Brook-
Protector. See Neck protector. Pursp. steam vacuum, L. Hassey. Pursp. steam vacuum, L. Hassey. Pursp. surve gear, C. C. Worthington
birsed, G. Lambe.  Bis, GBR.  Bail chair and tie, combined, J. Albrecht. 256,696, 98(,0)  Railway conduit, electric, Graham & Allen. 198,322  Railway fros, D. F. Vaushan. 198,455  Railway frog, pwitch, and guard rail block, J. D.
Green. St. Adv. Mr. H. Elliott S. C. C. Ballway switch lock, W. H. Elliott S. C. C. Ballway tie pulse, W. H. Wilson. S. C. Ballway tie pulser, G. Ensarling modes, E. L. C. C. C. C. C. C. C. Ballway, closed conduit for electric, C. D. Tis-
Rallways, electric cab sismal for. E. C. Wiley 405,500 Hallways, pointsman's indicator for, Lord & Lea- 500 Bake. See Hay rake. Register. See Car register. Caph register. Hotel
register. Registera air moistening and purifying attachment for, H. Illowiti Regulator. See Dranght regulator. Recolat. B. E. Baker. 386.605
Rock breaker, S. Jackson Etail budston. 488,654 Etail budston camera. Folding, D. H. Houston. 488,448 Boller. See Land roller. Rolling mill food mechanism, S. V. Huber. 488,447 Rolling mill roll bearing, H. W. Thomas. 488,466 Snach Ludczon, I. Hilling siles Et., W. Cable. 488,286
Saw, E. C. Smith
Sectional boiler, H. A. R. Dietrich. 198,365 Separator. See Grain separator. Setting tank, D. W. Fall et al. 198,365 Sewing machine. A. Vannette. 198,470 Sewing machine feeding mechanism, bettonbois. 7. Hosan. Sewing machine quifting mechanism, bettonbois. 36,308 Sewing machine quifting mechanism, G. A. Staf-
Shaft coupling, M. Abrabans. 505,551 Shakers, etc., movement for, Gerbardt & Jager- son. 505,000 Shoot metal pipe, J. W. Abrabans. 505,000
Shoe, L. C. Kruges Show case, A. Hulbert Show as A.
Smole bleaching apparaiss, J. T. Sands. 205.548 Speaking table attachment, W. Weber 525.569 Spindle, F. M. Garcelon. 505.670 Steam motion, H. L. Wilson. 505.670 Steam ontine, dupler, L. F. Voisard. 505.685 Strainer and serator, milk, P. S. Ryan 595.687
Straw stacker, provonsite, G. E. Warnhe. 108,498 Sugar manufacture, rettling tank for, R. W. Dem- lug. Switch. See Interlocking safety switch. Stringe, Loady & Richardson. 186,482
Table. Bee Elevator table, Tank. See Settling tank. C. Toobey Tee obest and attackment, C. Toobey Telephone apparatus, soln-controlled, C. C. Blake 581,089 Thill coupling, M. Wemple. Time lock, F. H. Blake.
Trobacon, machine for meaning and affixing tags to, D. J. Barr Tobacon, machine for meaning and affixing tags to, D. J. Burr Tobacon tagging machine, D. J. Burr. 56,275
Tonacco wrapper, J. Conley Transplanting machine, Moore & Fissimmens 585,507 Trap. See Asimal trap. Hackwater trap. Hasin trap. Troiley and feed wire bracket, L. S. Pforsts 585,409 Troiley for electrical conductors, D. M. Oppor 585,509
Trolley wire bracket, L. S. Pfoula 56, 40: Froiley wire hanger, I. B. Waisker 55, 50: Trombone gauge, J. L. De Good 566, 57 Trousers etrateher, S. M. Hathaway 56, 561 Troust, W. S. Foster 50, 561 Trunk, W. S. Foster 50, 561 Trunk, W. S. Foster 561, 562 Tubujar appearates, F. M. Ashier 561, 563
Turn indicator, C. M. Jarvis

1	Velocipede, E. C. Stearns	200,545
1	Velocipede, ice, D. G. Bolton.	106.558
	Telucipade, ros, 13. Gr. Morton	-
1	Voting machine, S. R. Davis	100,100
1	Wagon brake, J. W. Brubaker	596,611
1	Wagon brake lock, R. Ford, Sr	36,620
I	Washstand attachment, I. N. Glauber	390,390
	Water bag and food warmer, A. M. Plummer	596,501
		36,412
		536,496
	Well reamer, J. Deisch	06,440
	Wheel. See Fifth wheel, Paddlewheel.	
		200,002
		-
	Whetting cutting faces of chisels, machine for,	TOTAL FORM
	H. J. Goaling	Million I
	Whip socket, F. M. Beidier	36,478
	Wire rods, apparatus for treating, C. W. Bildt	/85,433
	Wrench, See Pipe and nut wrench.	
	Wienest and bit stands in Dalla	0.00 0.00
	Wrench and bit stock, H. Polis	Mary Comp.
	Wrench or clamp adjustment, W. J. Wright	100,470
	Wringer. See Mop wringer.	
ı		- 1

ĺ	Advertising check, H. J. Heinz	25,657
l	Display rack, M. Mayer	23,000
1	Hat. J. Brandenstein	20,000
	Hook, H. Davidson	
ì	Knife, meat trimming, H. L. Koenig	
	Lawn rake, L. Gibbs	23,060
	Mirror frame, C. F. Mosman	25,054
	Spoon, W. N. Capurro	23,601
	Spoon, A. G. Rogers	23,656
	Tool bolder, R. McKay	20,680

TRADE MARKS.	
Beverages, medicines, chewing gum, dietetic pasts or powder, and confectionery, G. H. McLin Blood pariflers, Rockwood & McCallum	25,206
Cotton, linen, woolen, and mixed fabrics, M. O. West. Disinfectanta, insecticides, and rat and roach	25,363
powder, Sanitol Manufacturing Company Goods and linings, certain named dress, Catlin &	25,274
Company.  Leather, preparation for cleaning and polishing,	25,261
E. H. Brown.  Leather, preparation for preserving and beautifying, E. H. Brown.  Lotions to protect animals from files and the like,	25,275
A. Adler Oil shortening, George Fowler, Son & Company	25,268
Otia, lubricating, J. C. Curtin.  Preparation for beautifying the skin, R. Kuntse.  Punch, milk, J. A. P. Pitt.	25,277 25,200 25,200
Remedies for rheumatism and disorders of the	25,207
Shirts, men's, Mansmann Brothers. Soap for antiseptic and disinfecting purposes, Fels & Company	25,360
& Company Soap for laundry and toilet use, G. D. Stead Soap Company	25,271
Soap, toilet, J. B. Williams Company	20,266
heating, G. Ewart	26,378

Canadian patents may now be obtained by Electron for any of the inventions named in the coing list, provided they are simple, at a cost of \$40 complicated the cost will be a little more. For screening address Munn & Co., 301 Procedury,

#### Advertisements.

#### ORDINARY RATES.

Incide Page, each insertion - - 75 cents a line Back Page, each insertion - - - - 81.00 a line

The above are charges per agate line—about eight ords per line. This notice shows the width of the line, it is est in agate type. Engravings may bead adversements at the same rate per agate line, by measurement, as the letter press. Advertisements must be converted at Publication Office as early as Thursday souther to appear in the following week's issue.

Patent Foot Power Machinery Complete Outfits.

Wood or Metal workers without power can successfully compete with the large shops, by using our New LA HORE SAVING Machinery, takes at an anost improved for practical shop Use, also for Industrial Schools. Seneca Fails Mfg. Co.



VEGETABLE PARCHMENT.-A VAL paper on the properties, uses and manufacture of product. Contained in SCIENTIFIC AMERICAN SUP-SENT, No. 945. Price in cents. To be had at this and from all newadoulers.

Star \* Maps



. . . A series of twelve elegantly printed Maps of the Hosenes, one for every month in the year. Specially prepared for use in North America. With descriptions accompanying each map, giving the names of the principal stars and constellations, showing their relative positions at given hours and days of the month. A most beautiful and convenient work, specially adapted for the use of those who desire to acquire a general knowledge of the starry realms. To which is added a description of the method of preparing and using artificial luminous stars as an aid in fixing in the mind the names and piaces of the various stars and onstellations, by Affred B. Beach.

Altogether this is one of the most popular, useful and valuable works of the kind ever published.

One quarko volume, elegantiy bound in cloth. Price

MUNN & CO., Publishers

361 Broadway, New York

# Study Electricity at Home by our correspondence method, with FREE APPARATUS. Terms low. Cast. free. Scientific Machinist, Clavel'd, O.

ARBORUNDUM



THE NEW TOWER BRIDGE, LONdon.—Description of the new bascule bridge recently erected over the Thames, in the vicinity of the Tower; with a comparison therewith of the Yan Buren street drawbridge, and the Haisted street lift bridge. Chicago. With fillustrations. Contained in Scientific Americas Supplicass Supplies and from all newsdealers.

1999 Ruby St., Rockford, Ill.



"OTTO" GAS AND GASOLINE ENGINES. 16 to 100 h. p. Can be used in cities or in country indepen-

No Boiler, No Danger, No Engin OVER
30.000 SOLD.
Otto Gas Engine Works, Isoseperated, Philadelphia

The value of the SCIENTIFIC AMERICAN as an advertising medium cannot be everestimated. Its circulation is many times greater than that of any similar journal now published. It goes into all the States and Territories, and is read in all the principal libraries and reading rooms of the world. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. This he has when he advertises in the SCIENTIFIC AMERICAN. And do not let the advertising seem influence you to substitute some vertises in the SCIENTIFIC AMERICAN. And do not let the advortising agent influence you to substitute some other paper for the SCIENTIFIC AMERICAN when selecting a list of publications in which you decide it is for your interest to advertise. This is frequently done for the reason that the agent gets a arger commission from the papers having a small circulation than is allowed on the SCIENTIFIC AMERICAN.

For rates see top of first column of this page or address MILINA & CO., Publishers.

dress MUNN & CO., Publishers, 361 Broadway, New York.

# 4 H. P. GAS ENGINE CASTINGS

A.F.WEED & CO. 106 & 108 Liberty &c. New York. Castings and Parts for Small Engines,

HE LINK-BELT COMPANIES, PHILADELPHIA. NEW YORK, CHICAGO.

Originators of the best practice in the use of Link-Belting of standard designa. Ewart Link-Belting (31 regular sizes). Sprocket Wheels, Rope Transmissions, Fibre-Graphite Self-Lubricant Journal Bearings and conveying any material.



VANDUZEN STEAM PUMP
THE SET IN THE WORLS.
Pumps Any Kind of Liquid,
Always in Order, asver Clogs nor
freess. Every Pump Garcates.
200 to 12000 Gallons per Hour.
Cost \$7 to \$75 eech. Address
THE VANDUZEN & TIFT CO.,
182 to 165 E. Second St., Cincinnati, 9.

Do Your Own
Printing!

\$4 Press for Carda, Circulare, etc. Press for Small Paper, \$40.

KELSEY & CO., MERIDEN, CONN.



ARMSTRONG'S Pipe Threading and Cutting - Off Machines. Both Hand and Power.

Bisses I to 6 inches.

Water. Gas. and Steam Fitters'
Tools, Hinged Fipe Viess, Fipe Cutters. Stocks and Dies universally
acknowledged to be THE BEST.

FF Send for Catalogue.

ARMSTRONG MFG. CO.
Bridgeport, Conn.

WHAT HAVE YOU?

premiume. Will make liberal terms. Write explaining anything new you have to offer. FAVORITE MFG. CO., 43 Wabash Ave., Chie

MALLEABLE

## SOCHE IS DEAD

To his own interest, who deals in Atons and Ammund Parts, or shot from and has not a copy of IDEAL it pages of solid information. Fort cot. (Montho: All PEAL MEFG. CO., Drawer 1800, New Mil

DRIPLESS STRAINER

Sent to any address on ucipt of price, 25c.

Standard Strainer Co. 36 Malden Lane.



ARTESIAN WELLS-BY PROF. E.

# OIL WELL SUPPLY GO.

ARTESIAN WELLS either Gaa, Oil, Water, or Mineral Test oilers, Engines, Pipe, Cordage, Drilling Fools, etc. Illus'd catalogus, price lists, and discount sheets on request. Pittsburg, Oil City and Bradford, Pa.
Alno, 32 Cortlandt St., New York.

#### BUY TELEPHONES

440 Monadnock Block, CHICAGO.

Largest Manufacturers of Telephones in the United States.



TRANSMISSION OF POWER BY Friction Pulleys.—By G. D. Biscox, M.E. Description and illustration of some of the many forms and combinations possible for the transmission and direction of power by contact pulleys. With 17 engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 937. Price Beents. To be had at this office and from



Gates Rock & Ohe Breaker

Capacity up to 200 tous per hour.

Has produced more ballast, road meetal, and broken more ore than all other Breake a combined.

Builders of High Grade Mining Machinery. Eing-Darraigh Concentration. Eing-Darraigh Concentration of the Capacity were.

CATES IRON WORKS,

26 C.So. Clinton St., Chicago
136 C. Liberty St. N.Y. 257 C. Franklin St., Boston, Mays.

#### NOW READY!

Fourteenth Edition of

# Experimental Science



REVISED AND ENLARGED.

120 Pages and 110 Superb Cuts added.

Just the thing for a present for any man, woman, student, teacher, or any one interested in science.

In the new matter contained in the last edition will be found the Scientific Use of the Phonograph, the curious optical illusion known as the Anorthocope, together with other now and interesting Optical Illusions. The Control of Chicago and Projection of Opaque Objects projection in Projection, Indocessing Optical Illusions in Projection, Indocessing Optical Institution of Projection of Opaque Objects points in Photography of Chicago and Illusions of Illusio

MUNN & CO., Publishers, Office of the SCIENTIFIC AMERICAN, 361 BROADWAY, NEW YORK. Founded by Matthew Carey, 1785.

HENRY CAREY BAIRD & CO.

NDUSTRIAL PUBLISHESS, BOOKSELLENG 2 REPORTS
\$10 Wallaut St., Philadelphia, Pa., U. S. A.

27 Our New and Revised Catalogue of Practical as

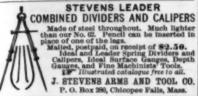
closentine Books, 85 pages, 8vc, and our other Catalogu.

and Circulars, the whole covering every branch of 8s

mee applied to the Aris, sent free and free of posta,

o any one in any part of the world who will furnish b

GAS ENGINES & VENTILATING FANS



MAN'S WORK IN THE DEFENSE OF Plants—By Joseph F. James. A paper on the insects and fungi injurious to plant life, and the most improved method-now used for destroying them. With 5 illustra-tions. Contained in SCIENTIFIC AMERICAN SUFFLE-MENT. Nos. 946 and 967. Price 10 cents each. To be head at this office and from all newsdealers.



Durable—Easily Applied.

This roofing is manufactured from natural Trinidad asphalt materials, and will not dry up and become brittle under exposure to the weather as coaltar roofings do.

Free sample of roof 12 years do, with circular and price tist to water the results of the weather and price tist to WA REEN CHEVILLAL & MFG. CO..

See Fulian Street, New York, U.S.A.

# MATCH \* MACHINERY.

WANTED—Financial assistance to take out foreign patents on a device for Stopping and Steering Vessels. Said device intended to prevent collisions or lessen the damage by same to a great extent, and to provide a suitable means of guiding vessel in case of disabling of rudder. U. S. patent allowed. Invention is practical. For further particulars, address



Parson's Horological Institute. School for Catchmakers

ENGRAVERS AND JEWELERS.

nd for Catalorus and References

PARSON'S HOROLOGICAL INSTITUTE, 302 Bradley Avenue, PEORIA, ILL.



STEEL BALLS for MACHINERY JOURNALS and Bi-CYCLES a specialty.

Balls from 16" to 2" diam. in stock Balls of Any Material or Nize made to order. Accuracy of sphere, size and uniformity of strength guaranteed. EF Write for Pricz.

Also manufacturers of Automatic Screw Machines, Bloycles, etc.

Cleveland Machine Screw Co. 133 2d Ave., Cleveland, O.

Fine Model and Experimental Work at moderate prices. Dynamos and Motors repaired Armatures rewound. All kinds of Electrical Applian-ces made. C. R. NETHING, El Centre St., New York.

Rubber Rolls and Wheels. Power Wringing Machines, Drying and Ventilating Fans. All styles of Trucks made to order. Catalogues free. GEORGE P. CLARK. Box L. Windsor Locks, Cenn.

The Bailey Automatic Bicycle Brake

# The Scientific American PUBLICATIONS FOR 1894.

The prices of the different publications in the United States, Canada, and Mexico are as follows:

The Scientific American (weekly), one year
The Scientific American Supplement (weekly), one year,
The Scientific American, Spanish Edition (monthly), one year,
3.60 BATES BY M

The Scientific American Architects and Builders
Edition (monthly), one year. 2.50

COMBINED RATES.

The Scientific American and Supplement 97.00
The Scientific American and Architects and Builders Edition,
The Scientific American, Supplement, and Architects and Builders Edition,
Proportionals Builders For Star Manches,
This includes most are realized for Star Manches,

This includes postage, which we say. Becalt by postal a express money order, or draft in order of MUNN & CO., 361 Brendway, New York.

Chain BELTING of Various Styles, ELEVATORS, CONVEYORS,

The JEFFREY MANUFACTURING CO., COLUMBUS, O.

Franches: CHICAGO—NEW YORK.

DISPOSAL OF THE GARBAGE AND Waste of Cities.—By W. F. Morsa. A statement of what, during the last two years, has been added to our knowledge on the subject of the disposal of city garbage and refuse; with special reference to the disposal by the of the organic waste and garbage of the Chicago Fair. Contained in Scientryic American Supplement, Sp. Price 10 cents. To be had at this office and from all newedenlers.

# Towers, Tanks and Tubs

PATENT SECTIONAL ALL IRON TOWERS. PLAIN ALL WOOD TOWERS

**ELEVATED TANKS** 

for Automatic Fire Sprinkler Plants. Louisiana Red Cypress Tanks a Specialty.

W. E. CALDWELL CO.

219 E. Main Street. LOUISVILLE, KY., U. S. A.

RECEIVER'S SALE. The entire plant and go and Tool Co., including real estate, tools, machine ory, patterns, etc. also thousands of dollars of orders or hand. This plant is located at the corner of Hudson and Seventh Sts., Buffalo, N. Y., and consists of a four story brick building fully equipped for the manufacture of tinner's machines and tools, machinery for working sheet metal, presess, dies, etc. The factory is now in operation, and all information in reference to same cheerfully given. Address MICHARL NEWRILI, Receiver, cor. Hudson and Seventh Sts., Buffalo, N. Y.

"ECLIPSE" GRAVER, DRILL & TOOL SHARPENER



For bolding tools of every description, for sharpening. Adjustable to any angle. Most practical, economical and indispensable tool for the purpose. Tools last longer, retaining accurate cutting edges at all times. Price \$1.75.

E. F. BOWMAN & CO...

2 to 5 & Chestmut St., Lancaster, Pa., Mfrs. of Eugravers', Watchmakers' and Jowelers' Tools and Supplies.

HYPNOTISM: its Uses and Abuses. The science book, \$1. Dr. Anderson, S.A.10, Masonic Tem., Chicago

SHORTHAND BY MAIL Taught by Reporters. Catalogue and first lesson FREE. POTTS SHORTHAND COLLEGE, Academy Bl'k, Williamsport, Pa



ELECTRICAL APPARATUS DESIGNED.
Inventions Developed. Correspondence Solicited.
F. B. CORRY, M.E., 75 Hathaway Building, Boston.

MATERIAL CARDAMENTALES (TAILES

GREAT MINING TUNNELS. - DE-STATIAL AND TOWN TOWN THE AND THE AND



Engineers and Firemen Send 2c. stamp for 24 page pamphlet containing a list of questions saked by a board of examining engineers. Stromberg Pub. Co., St. Louis, Mo.



KLIP BINDERS for Papers, Magazines, etc. Contents instantly removable. Adopted by U. S. Govt. and many libraries. IF Send 75c. for sample dozen. Covers to order. H. H. BALLARD, 188, Pittsfield, Mass.

MUSIC AND LONGEVITY.—A PAPER by Fighraim Cutter, M.D., in which the author endeavors to show that music prolongs or is thought to prolong life; that diseases peculiar to and preventive of long-evity are those that impede the circulation of air, blood and nerve force. That music is physiologically capable of enlarging the cheek and the capillaries and of calming and regulating, if not increasing nerve force, and that, other things being equal, longevity should belong to musical people. Contained in Scientific America. SUPPLEMENT. NO. 324. Thes is cents. To be had at this office and from all newdaling.



Watchman's Improved Time Delector
with 12 or 34 Keya, with
Safety Look attachment. Patented
1876-6-7. My inventions, and will and
all concerns selling

TURBINES. Sand for Pamphiet. Co.,

Scientific Book Catalogue

RECENTLY PUBLISHED. Our New Catalogue containing over 100 pages, includ-ing works on more than 6fty different subjects. Will be mailed free to any address on application. MUNN & CO., Publishers SCIENTIFIC AMERICAN,

361 Broadway, New York.



YOU CAN BECOME A WATCHMAKER

And establish yourself in a paying business, by securing our set of tools and Instruction Box. All first-classes, tools, which cost, as tools, which cost is tools, which cost is tools, which cost is tools, as tools, as

NICKEL: ITS HISTORY, USES, AND



CHEAP AND PERFECT FUEL GAS GAS BLAST FURNACES,

HIGH PRESSURE BLOWERS, ETC. Address, SO NASSAU STREET, NEW YORK.



Model & Experimental Work. Absolu

Advice and ideas not charged for. Send for particulars GARDAM & SON, 98 John Street, NEW YORK.



AGENTS \$75 A WEEK AT HOME, using or selling PRACTICAL PLATING DYNAMO. Themodera method, used in all factories ern method, used in all to plate new goods. Pi silver, nickel, etc., on jewelry, table-ware, bio W. P. HARRISON & CO., Clerk No. 15, Columbus, Ohio.

ICE-HOUSE AND COLD ROOM.-BY IS. G. Hatfield. With directions for construction. Four-engravings. Contained in SCIENTIFIC AMERICAN SUP-PLEMENT, No. 59. Price 10 conts. To be had at this office and from all newsdealers.

VOLNEY W. MASON & CO. FRICTION PULLEYS, CLUTCHES, and ELEVATORS PROVIDENCE, R. I.



MAGIC LANTERNS WANTED AND FOR SANDER HARBACH & CO. 809 Filbert St. Phila. Pa.

A CREMATION SCENE.—EXPLANation of the curious, and, at the same time, scientific, spectacle exhibited by Powell, the well-known illusionist, and suggested by the cave scene in Haggard's novel, "She." With 4 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 962. Price 10 cents. To be had at this office and from all newsdealers.



PROPOSALS.

U. S. ENGINEER OFFICE, ARMY BUILDING, NEW Gredging \$80,00 cube yards, more or less, of material from Harlem River and Spuyten Duyvil Creek, on lite of Harlem River Improvement, and for furnishing materials and workmanship for construction of about 500 linear feet of pile revetment for protection of outh side of cut through Dyckman Meadow, will be received here until 12 o'dlock, noon, often burntshed on application. ROBERT McGREGOR, 26 Liceutenant, Engineers.

U. S. ENGINEER OFFICE, ARMY BUILDING, NEW dredging the channels in Newbown Creek, New York, will be received at this office until 12 M., October 11, 1994, and then publicly opened. All information furnished on application to this office. ROBERT MCGREGOR, 3d Lioutenant, Corps of Engineers.

DEAFNESS

and HEAD NOISES relieved by uning Wilson's Common Sense Ear-Drume New scientific invention, entirely different in construction from all other devices. Assist the deaf when all other devices rail, and where medical skill has given no relief, they are safe, comfortable, and invisible; have no wire or string attachment. Write for pamphiet. wilson ran Drum Mrg. Co., Louisville, Ky.

PHOTOGRAPHIC LABORATORY .-Description by Gastor. Tissandler of an inexpensive and easily arranged laboratory for the use of anateur pho-tographers. With 2 lilustrations. Contained in SCIEN-TIFIC AMERICAN SUPPLEMENT, NO. 964. Proc 16 conts. To be had at this office and from all newsdoalers

DIETZ" TUBULAR DRIVING LAMP.



IT is the only practicable and perfect driving lamp ever made. IT will not blow out: light.
IT will not blow out: light.
IT looks like a locomotive head IT harows all the light straight abead from 28 to 30 feet.
IT burns kerosene.
IT burns kerosene.

IT burns kerosens.

EF Sent for Book.

R. E. Dietz Co.,

77 Laight Street,

New York.

A BRIGHT ACTIVE MAN OF FIFTEEN YEARS' cago and the West, wants to add to his line something of merit. Knows the Western trade thoroughly. Will handle goods on a strictly commission basis. Correspondence invited. Address "Engineering," room 180, Stewart Building, New York City.



HOW TO MAKE TELEPHONES AND Telephone Calls.—Directions for making the latest and most improved form of telephone, with perspective and sectional views in which all the parts are shown exactly full size. A paper for the benefit of those who are desirous of making telephones for their own use or for sale. With 20 illustrations. Contained in Scientific American Scientific and this office and from all newsdesiers.

EDGE TOOLS are often nearly ruined by using a grindstone not adapted to the work. Our
quarries produce a large variety of grit
suitable for grinding any tool.

If May we send you our Catalogue,
which soil give you some information?
GRAFTON STONE COMPANY,
NO. 80 River Street,
GRAFTON, OHIO.

HIGH GRADE ONLY. Warranted. Contract ors desiring a trustwortby Jack Screw, ad-dress RUMSEY & Co., L4d., Seneca Falls, N. Y.

CONSULTATION INVENTORS. perimental work of every description. Automatichinery designed and built. IF Send for circular.

MALTBY MVG. CO., Brooklyn, N. V.

DEAFNESS & HEAD NOISES CURED MALTBY MFG. CO., Brooklyn, N. Y.

MALTBY MFG. CO., Brooklyn, N. Y.

A Valuable Book

The History only, 858-8-8-way, N.Y. Book of profit FREE



12,500 Receipts. 708 Pages. Price \$5,

13,500 Receipts. 708 Pages. Price 35.

Bound in Sheep. 36. Half-Morocc., 36.50.

This splendid work contains a careful compilation of the most useful Receipts and Replies given in the Notes of the most useful Receipts and Replies given in the Notes of the most useful and the Notes of the most useful and the Notes of the most useful and the new form and useful and the most comprehensive of the most comprehensive the new form of the third over placed before the public.

The work may be regarded as the product of the studies of the third over placed before the public usion-novel, the first of the world; the information given movel, the first of the highest value, arranged and condensed in concles form convenient for ready use.

Almost every inquiry that can be thought of, relating to formulae used in the various manufacturing indus-tries, will here be found answered.

Instructions for working many different processes in the arts are given.

Those who are engaged in any branch of industry probably will find in this book much that is of practical value in their respective callings.

Those who are in search of independent business of employment, relating to the bome manufacture of sam-ple articles, will find in it hundreds of most excellent suggestions.

MUNN & OO., Publishers, SCIENTIFIC AMERICAN OFFICE. 361 Broadway, New York.

#### Movertisements.

ORDINARY RATES.

inside Page, each insertion. - 75 cents a line Back Page, each insertion. - - \$1.00 a line

COLD FORGED PRODUCT.

# Fluted Tire Bolt Slow Speed Iron-Clad Alternators,



on bolt. The finter

COLD FORGED MACHINE SCREWS
STOVE BOLTS
LOCK CAP SCREWS
SIDE KNOB SCREWS
THREADED WIRES

AMERICAN SCREW COMPANY, PROVIDENCE, R. I.



#### SAVE % YOUR FUEL

By using our (stove pipe) RADIATOR, B has 120 Cress Tubes where 4606 eq. in. of Iron get intensely hot, thus making ONE stove or furnace do the work of TWO. Send postal for proofs

from prominent men.

Te introduce our Radiator, the first order from each seighborhood filled at WHOLESALE price, thus securing an agency. Write at once. gency. Write at once.

ROCHESTER RADIATOR OO.,

Rochester, N. V.

"Missing Link" Found at Last!

THE "KEYSTONE" OPEN LINK

Ring or Em Bolls, Thumb Screen, and Nuts. PHILADELPHIA DROP FORGE CO. 2336 American St., Philadelphia, Pa.

Eastman Kodak Company,

ADJUSTABLE HOLDERS



PHILADELPHIA, PA. SAN FRANCISCO, CAL

NEW ORLEANS, LA. MEXICO CITY, MEX. COLUMBUS, OHIO. CINCINNATI, OHIO.

BOSTON, MASS. MINNRAPOLIS, MINN.



CHICAGO, ILL.
PITTSBURG, PA.
DALLAS, TEXAS.
PORTLAND, ORE.
HAVANA, CUBA.
SYRACUSE, N. Y.

BICHMOND, VA

ORPORATION

## ASTRONOMY

Made easy and interesting with the help of our ne Celestial Planisphere and Handbook. For descriptive circular address

OVANDINS

AYNE LECTRIC

Eastern Office, No. 115 Broadway, NEW YORK.

Main Office and Factory, FORT WAYNE, IND.

Direct Current Incandescent Lighting,

Power Generators, Motors and Appliances.

BRANCH OFFICES:

OMAHA, NER.

"Wood" System of Arc Lighting,

# IRIFFIN

The Only Perfect Pulverizer of all Refractory Substances.

Will work either wet or dry, and deliver a finished product. Capacity, 3 to 4 tons per hour on Phosphate Rock; 11 to 2 tons per hour on Portland Cement, Quartz, or Ores, depending on hardness of material to be pulverized and fineness of product. Grinds from 30 to 250 Mesh with equal facility.

NO JOURNALS IN GRINDING CHAMBER. BALL RIGID ON SMAFT, HAVING DIRECT POSITIVE ACTION ON MATERIAL. MINI-MUM POWER PRODUCES MAXIMUM AMOUNT OF PRODUCT. IT IS ABSOLUTELY GUARANTEED IN EVERY RESPECT, BOTH AS TO CONSTRUCTION AND CAPACITY. PIRST COST, WEAR, AND OPERATING EXPENSE MUCH LESS THAN STAMP MILLS. LARGE NUMBER OF MILLS IN USE ON DIFFERENT MATERIALS WITH POSITIVE SUCCESS IN EVERY INSTANCE.

Correspondence solicited, and illustrated descriptive pamphlet furnished on application to

Bradley Pulverizer Co., 92 State St., Boston. .....

# The American Bell Telephone Company,

125 Milk Street, Boston, Mass.

This Company owns Letters-Patent No. 463,569, granted to Emile Berliner November 17, 1891, for a combined Telegraph and Telephone, and controls Letters-Patent No. 474,231, granted to Thomas A. Edison May 3, 1892, for a Speaking Telegraph, which Patents cover fundamental inventions and embrace all forms of microphone transmitters and of carbon telephones.

STARRETT'S Adjustable Jaw Gut-Nipper. Office Head FELT & TARRANT MFG CO.

FOR FINE TOOLS IN EVERY SHE



SCIENTIFIC AMERICAN SUPPLE-MENT. Any desired back number of the SCIENTIFIC AMERICAN SUPPLEMENT can be had at this office for the country.



# SECTIONAL PIPE COVERINGS

ASBESTOS

NON-CONDUCTING COVERINGS FOR STEAM AND HOT WATER PIPES, BOILERS ETC. READILY ATTACHED OR REMOVED BY ANY ONE . SPECIAL ASBESTOS BOILER COVERINGS

ME ARE PREPARED TO TAKE CONTRACTS FOR APPLYING STEAM PURE AND BOILER COVERNOS MAIN MAIL OF THE UNITED SIZETS, IL N., JOHNS ASBESTOS HILLBOARD, SHEATHINGS, BUILDING FELTS, FIRE PROOF PAINTS, LIQUID PAINTS, ASBESTOS ROOFFINEING

H.W. JOHNS MANUFACTURING COMPANY, 87 MAIDEN LANE, N.Y. CHREEV CITY, CHICAGO, PHILADELPHIA BOSTON, LOHIO



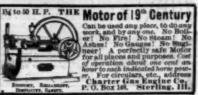
ENGINES, BOILERS & MACHINE TOOLS, Complete outfits furnished. Send for prices and Catalogue "H." W. P. DAVIS, Rochester, N. Y.

EMERY chines and Grinders' Supplies, Quick process and large stock, When in a burry. CINCINNATI, and STROUDSBURG, PA.





COMPACT, LIGHT, PERFECT IN DETAIL Rochester Optical Co. Hochester, N. Y.



IF ESTABLISHED 1845.

The Most Popular Scientific Paper in the World Only \$3.00 a Year, Including Postage. Weekly-52 Numbers a Year.

Weekiy-52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions, Noveities in Mechanics, Manufactures, Chemistry, Electricity, Telestraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc. Complete list of Patents each week.

Terms of Subscription.—One copy of the SCIEN-TIFIC AMERICAN will be sent for one year—58 numbers— postage prepaid, to any subscriber in the United States, Canada, or Mexico, on receipt of Three Dollars by the publishers; six months, \$1.50; three months, \$1.50.

The safest way to remit is by Postal Order, Draft, or Express Money Order. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO., 361 Broadway, New York.

### - - THE - -

# Scientific American Supplement

This is a separate and distinct publication from THE SCIENTIFIC AMERICAN, but is uniform therewith in size, every number containing sixteen large pages full of engravings, many of which are taken from foreign papers and accompanied with translated descriptions. THE SCIENTIFIC AMERICAN SUPPLEMENT is published papers and accompanied with translated descriptions. The Scientific American Supplement is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geology, Mineralogy, Natural History, Geography, Archweology, Astronomy, Chemistry, Electricity, Light, Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, ship Building, Marine Engineering, Photography, Technology, Manufacturing Industries, Sanitary Engineering, Agriculture, Horticulture, Domestic Economy, Biography, Medicine, etc. A vast amount of fresh and valuable information obtainable in no other publication.

The most important Engineering Works, Mechanisms, and Manufactures at home and abroad are illustrated and described in the Supplement.

Price for the Supplement.

Price for the Supplement, for the United States, Canada, and Maxico, \$4.00 a year; or one copy of the Supplement, both mailed for one year to one address for \$7.00. Single copies, 10 cents. Address and remit by postal order, express money order, or check,

r, express money order, or check, MUNN & CO., 361 Brondway, New York

# Building Edition.

THE SCIENTIFIC AMERICAN ARCHITECTS' AND BUILDERS' EDITION is issued monthly. \$250 a year. Single copies, 35 cents. Thirty-two large quarto pages, forming a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors, and with other fine engravings; illustrating the most interesting examples of modern Architectural Construction and silled subjects.

allied subjects.

A special feature is the presentation in each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with Plans, Descriptions, Locations, Estimated Cost, etc.

The elegance and cheapness of this magnificent work have won for it the Largest Circulation of any Architectural publication in the world. Sold by all newsdealers. \$2.50 a year. Remit to

MUNN & CO., Publishers,

361 Breadway, New York.

PRINTING INKS.